# Metals Review

THE NEWS DIGEST MAGAZINE

Volume XXV - No. 9 Metal Show Section Following P. 24 September, 1952

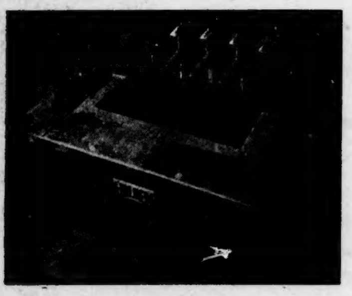


# HOLDEN

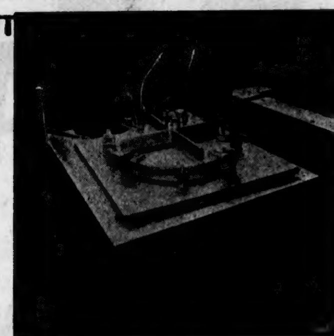
## *Furnaces*

## *Salt Baths*

## SALT BATH CONVEYORS for these applications:



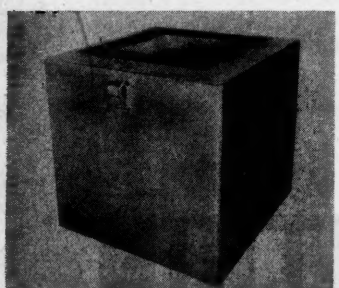
Type 202 Electrode Furnace, Temperature range 300-1750° F.



Liquid Nitriding Furnace.

| | |
|---|---|
| Annealing | Neutral hardening |
| Silver brazing | Brass brazing |
| Copper brazing | Austempering |
| Martempering | Paint Stripping |
| Wire annealing | Wire Patenting |
| Descaling | Desanding |
| Isothermal annealing | Bright tempering |

Liquid Carburizing
Aluminum heat treating
High Speed steel hardening
Cleaning of rubber molds

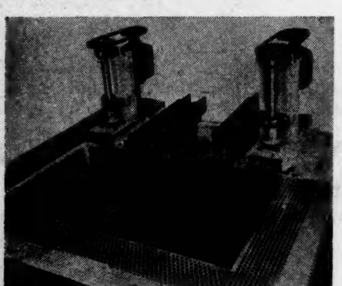


Prefabricated ceramic pot assembly, for use in over-the-side electrode furnaces with neutral baths.

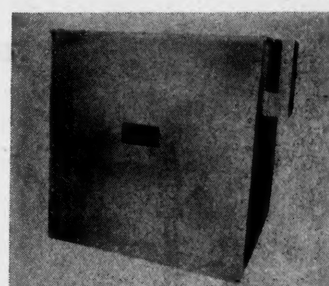
Gas Fired Type 212, Temperature range 300-1700° F.

## TYPE 401 FURNACES

1. Pumps hot salt, with one pump, at a minimum rate of 100 gallons per minute.
2. Filters the sludges from the salt below the screened area in a trough approximately 8" deep x 6" wide in which filter screens are utilized.
3. Forced cooling for large production is accomplished by the use of an eight ounce blower which extracts hot air from the surface of the pot, and where necessary, a small jet of water is introduced at the entrance point of the cool air for added cooling speeds on large production applicants.



Type 401 Marquenching Austempering Furnace.



Furnace assembly of martempering-austempering unit, gas fired for small production application.

## THE A. F. HOLDEN COMPANY

P. O. Box 1898, New Haven 8, Conn. 11300 Schaefer Highway, Detroit 27, Michigan

# Metals Review

**THE NEWS DIGEST MAGAZINE**

**VOLUME XXV, No. 9** **SEPTEMBER, 1952**



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## CONTENTS

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### NATIONAL METAL CONGRESS SECTION



### DEPARTMENTS



### ASM REVIEW OF METAL LITERATURE

# Foundation for Education and Research To Be Established

**Subject to confirmation by the membership of the A.S.M. at its annual meeting in Philadelphia on Wednesday, Oct. 22, 1952, the Board of Trustees of the Society at its meeting in Cleveland on July 31 completed arrangements for the establishment of the American Society for Metals Foundation for Education and Research. The Board authorized turning over to the Foundation assets of the Society totaling $650,000. This amount will yield to the Foundation between $25,000 to $30,000 a year, which the Trustees of the Foundation will be authorized to expend for the advancement and dissemination of scientific knowledge through educational activities and research.**

The establishment of the A.S.M. Foundation culminated after almost a year of consideration and discussion, not only among the Trustees but with the past-presidents of the Society and directors of research and education. The Foundation was presented to the Board of Trustees by the Secretary of the Society in a written report filed with them at the meeting in Pittsburgh on January 31 of this year. In that report, the Secretary pointed out that due to the present financial condition of the Society as well as an estimate of the future prospects, a portion of excess income over expenditure in each year should be placed into a Foundation so that the earned income from the funds of this Foundation might be used for the same purposes that the Society uses funds for education and research. It is possible to make appropriations each year for certain activities to be carried on by A.S.M. from the earned excess income of the Society. However, that would be spending the principal. If the activities are carried on by the Foundation they will be paid for from income on the Foundation Fund rather than from the principal itself.

From the January meeting until the culmination of the reports, the Board has been busily investigating and studying the rules and regulations governing the Board of Trustees of the Foundation and finally came to the conclusion that the time was propitious for the establishment of the Foundation, and the following rules and regulations were drawn up accordingly.

The A.S.M. Foundation is incorporated under the laws of Ohio and in the articles of Incorporation the purposes of the Society are stated as follows:

"The purpose for which this corporation is formed is to provide for the advancement and dissemination of scientific knowledge, particularly with respect to the technology of metals, for the use and benefit of the public at large, either through educational activities and research carried on by the Foundation or through the support of educational and research activities in established organizations and institutions. The Foundation shall at all times be operated exclusively for the purpose stated herein. The property of the Foundation shall be held as an endowment fund in perpetual trust for such purpose, and the income from the property of the Foundation shall be used exclusively for such purpose. No part of the net earnings of the Foundation shall inure to the benefit of any private shareholder or individual, and no part of the activities of the Foundation shall consist of carrying on propaganda or otherwise attempting to influence legislation. No disbursement shall be made by the Foundation in support of the activities of any organization or institution unless such organization or institution is, at the time of such disbursement, organized and operated exclusively for charitable, scientific, literary or educational purposes, no part of the net earnings of which inures to the benefit of any private shareholder or individual and no part of the activities of which consists of carrying on propaganda or otherwise attempting to influence legislation. In the event of the dissolution of the corporation, the Board of Trustees shall dispose of its assets, in trust, to further its purpose as stated above, without preference in favor of any member, officer or trustee, upon such terms and conditions, consistent with its purpose, as the Board of Trustees shall determine.

"The following persons shall serve as trustees of the Foundation until the expiration of the terms hereinafter fixed with respect to each of them:

Harold K. Work, who shall serve as a trustee until Nov. 30, 1953.

Arthur E. Focke, who shall serve as a trustee until Nov. 30, 1954.

Walter E. Jominy, who shall serve as a trustee until Nov. 30, 1955.

John Chipman, who shall serve as a trustee until Nov. 30, 1956.

Ralph L. Wilson, who shall serve as a trustee until Nov. 30, 1957.

The powers, property and affairs of the Foundation shall be exercised, conducted and controlled by its Board of Trustees.

"The Board of Trustees shall at all times consist of five members. Except as otherwise provided herein, each member of the Board shall serve for a term of five years, the term of one member expiring on November 30 of each year. At the expiration of the term of each member of the Board, the person who is then serving as president of American Society for Metals, an Ohio corporation not for profit, shall become entitled to serve as a member of the Board of Trustees of the Foundation, if he is able and willing to do so, to succeed the trustee whose term then expires. Until acceptance of membership by a successor, however, such Trustee shall continue to act as a member of the Board. If the person then serving as president of American Society for Metals should be unable or unwilling to serve as a trustee of the Foundation, or if for any other reason a vacancy should exist in the trusteeship, the Board of Trustees shall elect to membership, to fill such vacancy, a person who previously shall have served as president of American Society for Metals, or, if there be no such person who is able and willing to act, shall elect some other suitable person to serve in such capacity. When a trustee ceases to act in such capacity during the term of his membership on the Board, his successor shall serve during the unexpired portion of the term."

As stated at the beginning of this report, all of the provisions have been taken care of and consummated, including the articles of incorporation and the rules and regulations governing the new Board, and the new Board has had its first regularly called meeting.

However, all of the afore-mentioned organizational activities have been based upon the fact that the activities do not become lawful or consummated until the Foundation has been approved by the membership of the Society at its annual meeting in Philadelphia on Oct. 22.

## deCoriolis at Old Timers' Night

*E. G. deCoriolis (Second From Left), Director of Research, Surface Combustion Corp., Spoke on "Automation in Metals Treating" at Old Timers' Night at Toledo recently. Shown above at the speaker's table are, from left: F. D. Widner, Surface Combustion Corp., incoming chairman; Mr. deCoriolis; S. L. Widrig, chief metallurgist, Spicer Manufacturing Co.; and R. J. Huebner, Electric Auto-Lite Co., retiring chairman*

Reported by F. D. Widner
***Surface Combustion Corp.***

When Toledo Chapter held its annual "Old Timers" night, members and guests heard E. G. de Coriolis, director of research, Surface Combustion Corp., discuss "Automation in Metals Treating". Mr. de Coriolis has been an active leader in the development of heat treating processes and equipment during the 25 years he has held this position.

Industry is no longer content to merely purchase furnaces, Mr. de Coriolis stated. It is now demanding automatic mechanisms for getting the work into and out of the furnaces. This trend has increased to the point that the mechanism now occupies a position as important as the furnace design itself. The speaker showed slides of an integrated line of rotary retort furnaces for carburizing, reheating for hardening, quenching, washing, and drawing parts without the use of a furnace operator. Parts are automatically fed from a hopper to the carburizing furnace and discharged into a tote box.

Slides of three types of automatic feeders, rotary, elevator, and magnetic gate, were shown by Mr. de Coriolis. Slides of a hardening furnace synchronized with a quenching press where the furnace was dwarfed by the press, and a furnace of tremendous size used for processing continuous strip in a steel mill were also shown.

A movie showing an ingenious shuffle bar feeder designed to feed 1¾ in. diameter by 29 in. long bars to a high-speed forging furnace was shown. Three tons of bars are held on the feeder at one time and fed to the furnace at the rate of 300 pieces per hour. The bars are automatically pushed through the furnace by a separate mechanism from which they roll down an inclined track to the forging press.

## Texas Hears Discussion On Tool and Die Steels

Reported by C. L. Horn
***Metallurgist, Hughes Gun Co.***

"Tool and Die Steels" were discussed by C. P. McShane, metallurgist, Crucible Steel Co. of America, at a recent meeting of the Texas Chapter, A.S.M.

The basic principles of heat treating toolsteels, with particular reference to the expansion, contraction and formation of martensite and their relationship to the tension and compressive stresses in the finished product, were discussed. A part should be designed so a favorable balance of stresses will be obtained after heat treatment. This balance may be obtained by quenching in different mediums, depending on size and shape of the tool or die. Heat treatment and type quench to be used should be considered along with the chemical composition and design of the tool or die for the best balance of stresses.

Tempering too soon, that is, before hardening quench is completed, often causes unfavorable stresses which are normally a result of incomplete transformation. Double tempering is beneficial because the second draw tempers the untempered martensite. Overheating during the austenitizing cycle causes coarse-grain steel and results in a brittle tool or die.

Air-hardening steels are adaptable for parts where very small dimensional change and little distortion is desired. Decarburization often causes cracks in toolsteels if not removed during machining before heat treating. Many parts are cracked during grinding. If grinding is too severe, critical temperature may be exceeded and result in an untempered brittle surface structure.

## *Compliments*

To JAY M. SHARP on his recent promotion to the newly created post of advertising promotion manager for the Aluminum Co. of America. He has been assistant advertising manager for the company since 1950.

♦ ♦ ♦

To CYRIL STANLEY SMITH who is to receive the Francis J. Clamer Medal of the Franklin Institute for his metallurgical contribution to the development of atomic energy during and since World War II, in October at the Institute in Philadelphia. Dr. Smith is professor of metallurgy and director of the Institute for the Study of Metals at the University of Chicago. He will deliver the Campbell Memorial Lecture at the National Metal Congress in Philadelphia in October.

♦ ♦ ♦

To WILLIAM W. AUSTIN, JR., on his acceptance of an appointment as associate professor of mechanical engineering and technical director of the department of engineering research at North Carolina State College, Raleigh, N. C. For the past seven years he has been senior metallurgist with the Southern Research Institute, Birmingham, Ala. Prof. Austin is a member of A.S.M.'s Publications Committee.

## Sir William Griffiths Dies

Sir William T. Griffiths, 57, died July 30 in Kenley, Surrey, England, after a short illness.

Sir William became associated with the Mond Nickel Co., Ltd., an affiliate of International Nickel Co. of Canada, Ltd., in 1926 and was manager of Mond's development and research department from 1928 to 1945 when he was made chairman and managing director. In November 1945 he was elected vice-president in charge of operations in Great Britain and European activities and a member of the board of directors of International Nickel Co. of Canada. He left Mond and Inco in 1950 and became active as a metallurgical consultant.

Knighthood was bestowed upon Sir William in 1946 by George VI in recognition of his public services, particularly during World War II, when he was metallurgical consultant to the British Services and Production Ministries and a member of many metallurgical research committees.

Sir William was a member of several British and American technical societies and was a former president of the Institute of Metals of Great Britain. In 1948 he received the Simms Gold Medal from the Council of the Royal Aeronautical Society.

# *Speakers Review Growth of Titanium*

*"Titanium" Was the Subject of the Talks Given by J. R. Long, Staff Metallurgist, National Academy of Sciences, and J. Glasser, Research Chemist, Armour Research Foundation, at a Recent Meeting of the Chicago Chapter. Pictured are: C. T. Prendergast, chairman; E. L. Roff, vice-chairman; Mr. Long and Mr. Glasser; and W. E. Mahin, technical chairman*

Reported by Vernon Scott
*Acme Steel Co.*

"Titanium is on its way to becoming one of the tonnage metals in the world", according to Julian Glasser of Armour Research Foundation, who spoke at a meeting of the Chicago Chapter where he and James R. Long, National Academy of Sciences, teamed up to discuss the progress of this new "wonder metal".

Dr. Glasser reviewed the history of titanium's discovery, isolation and first laboratory experiments in reduction. He illustrated how production for commercial exploitation has grown from its beginning in 1942 at the Salt Lake City station of the Bureau of Mines to its present rate of about 1000 tons per year of commercially pure sponge. This rate is expected to increase to about 5000 tons per year by the end of 1952, and growth should continue to increase for the next several years. The interesting thing about this increase is that encouragement for this development is not primarily from the producers, but rather from consumers who want to take advantage of titanium's unique combination of light weight, high strength and resistance to corrosion. Another accelerating factor in its development is that ore is plentiful in the western hemisphere and would not be subject to interruption of supply in time of war.

Development activity is at a fever pitch, with emphasis in industry on improved methods of reduction, closely followed by melting and fabricating techniques. Titanium's extreme solubility for gases requires that atmospheres be controlled for a great many of the reduction and processing techniques so far developed. It seems unlikely that this condition will improve. Volume production by one of the more promising reactions would result in an excess of caustic soda that would have to be disposed of.

At present, mining of titanium ores is done by companies primarily interested in using the oxide for pigments; reduction processes by new companies set up for this purpose by existing companies or groups of companies; and fabrication and processing by new divisions of existing companies.

Dr. Glasser closed his talk by reviewing the major problems of control in production of commercial sponge. One major problem is the absence of a fast method of analyzing for oxygen content. The only method available at present is the vacuum-fusion process which costs in the neighborhood of $100 per analysis, and is limited to a relatively few samples per week per analyzing unit.

Mr. Long took over the discussion to review the physical metallurgy of titanium. It is of interest to industry, not only because of its light weight, high strength, and corrosion resistance, but also because of its high electrical resistivity and nonmagnetic properties. Its solubility for gases requires that it be handled under controlled atmosphere for a great many fabricating techniques just as in its reduction. In general, most of the metalworking techniques in use on other metals will apply to titanium but with modification and special handling required. For example, titanium will dissolve its own oxides and nitrides so that fusion welding has so far not been very successful. Spot and flash welding, however, look very promising. Fabrication problems can be summarized as requiring study and development but not as insurmountable.

Heat treatment is virgin territory; while the pure metal does not increase in properties with thermal treatments, properties can be controlled by cold working. Indications are that the alloys will have to be worked at a relatively high level of properties and then these properties increased moderately by heat treating, which will be complicated because titanium exhibits rapid grain growth at elevated temperatures.

The present rate of development points in the direction of first uses being of the pure metal, and use of alloys will follow rapidly. The commercially pure metal will have a hexagonal structure with resultant low ductility, but will be capable of fabrication in the annealed and cold worked conditions. Titanium shows promise in the military field where it will be used for weight reduction in equipment used and handled by ground troops. It will probably replace stainless for airframe applications up to service temperatures in the neighborhood of 700°F.

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## Vanadium Corp. Adds Two New Facilities for Ferro-Alloy Production

Additional ferrosilicon for the nation's expanded steel industry is now being produced at a new $8,000,000 plant of Vanadium Corp. of America, at Graham, W. Va. The company is also constructing a plant at Cambridge, Ohio, which will house Vanadium Corp. aluminum and ferro-alloy operations.

The Graham plant, on the eastern bank of the Ohio River, can produce 50,000 tons per year of various grades of ferrosilicon. The five new electric-arc furnaces, 22 to 25 ft. in diameter, are among the largest and most efficient in the alloy-producing industry. The new plant is in close proximity to quartzite, its principal mineral raw material. Electric power to operate the furnaces, which have rated capacity of 50,000 kw., is derived from the nearby Philip Sporn generating plant of Appalachian Electric Power Co.

The Cambridge plant began production of alloys late in August. Initial operations consist of melting of secondary aluminum and manufacture of aluminum alloys. Production of ferrovanadium, Grainal alloys, low-carbon ferrotitanium and other alloys is scheduled for the spring of 1953. Since most of the current output of the aluminum division is employed by the company in its manufacture of vanadium alloys, concentration of these two operations in a single plant is expected to yield important economies.

In 1951, Vanadium Corp., world's second largest producer of ferro-alloys, had sales of approximately $36,000,000, more than double the sales for 1949. The present expansion program is the largest in the history of the company.

# American Society for Metals

EXECUTIVE OFFICES - 7301 EUCLID AVE.

**CLEVELAND 3, OHIO**

CABLE ADDRESS: "ASM CLEVELAND"

**COMMITTEE ON REFRACTORY MATERIALS AT HIGH TEMPERATURES**

**Roger A. Long**
(Committee Chairman)
Chief, Metallurgical Branch
National Advisory Comm. for Aeronautics
Cleveland Hopkins Airport
Cleveland 11, Ohio

**Ray T. Bayless**
(Committee Secretary)
Assistant Secretary
American Society for Metals
7301 Euclid Avenue
Cleveland 3, Ohio

**G. M. Ault**
National Advisory Comm. for Aeronautics Laboratory
Cleveland, Ohio

**Wm. L. Badger**
General Electric Co.
Gas Turbine Division
Lynn, Mass.

**K. M. Bartlett**
Thompson Products, Inc.
23555 Euclid Avenue
Euclid 17, Ohio

**Howard Cross**
Battelle Memorial Institute
Columbus 1, Ohio

**Arthur W. F. Green**
Allison Division
General Motors Corp.
Indianapolis, Ind.

**J. J. Harwood**
Office of Naval Research
Dept. of the Navy
2710 Bldg. T-3
Washington 25, D. C.

**Willson Hunter**
National Advisory Comm. for Aeronautics
Cleveland 11, Ohio

**J. B. Johnson**
Wright-Patterson Air Force Base
Dayton, Ohio

**E. Pekarek**
Thompson Products, Inc.
23555 Euclid Ave.
Euclid 17, Ohio

**Benjamin Pinkel**
National Advisory Comm. for Aeronautics
Cleveland 11, Ohio

**John C. Redmond**
Kennametal, Inc.
1 Lloyd Avenue
Latrobe, Pa.

**Howard Scott**
Westinghouse Electric Res. Labs.
East Pittsburgh, Pa.

**L. F. Yntema**
Fansteel Metallurgical Corp.
2200 Sheridan Road
N. Chicago, Illinois

## CONFIDENTIAL SESSIONS

## Refractory Materials for High Temperatures

You are cordially invited to make application to attend the two-day confidential conference on Refractory Materials for High Temperatures to be held under the auspices of the American Society for Metals at the Carter Hotel, Cleveland, Ohio, on

Monday, November 24, 1952
Tuesday, November 25, 1952

This meeting is held to provide an opportunity for the presentation and discussion of classified information that qualified engineers need to know in the performance of their jobs and in the best interests of national defense.

The preliminary program for this meeting is outlined on the next page. The variety of the subjects listed and the high qualifications of the speakers are assurance that the program will be an outstanding success.

**This conference, while under the auspices of the ASM, is not limited to ASM members but to all individuals who can comply and who file in advance security qualifications.**

Security regulations require that attendance at this meeting must be limited to citizens of the United States who possess evidence of current clearance through "confidential" by the Air Force, Navy, Research and Development Board, Atomic Energy or other credited United States Government agency.

To attend, the application form on page 3 must be filled out and returned to the ASM headquarters in Cleveland through the military security officer having cognizance over the plant or activity and contract with which you are connected.

Once admission has been secured to the meeting room at the Carter, Security Authorities will require anyone leaving and re-entering to prove his clearance identity. Therefore, it has been arranged that luncheon will be served on Monday and Tuesday in the room adjoining the conference room. However, the meeting will be adjourned for dinner on Monday, between the afternoon and evening sessions. Luncheon will be served on Tuesday after the morning session and before the inspection trip at N.A.C.A.

### ENROLLMENT FEE

Enrollment fee will be $10.00. This will include two luncheons and gratuities plus transportation to and from N.A.C.A. Laboratory and the Hotel Carter.

### HOTEL RESERVATIONS

Those attending the conference are requested to make their hotel reservations direct with Miss Betty Maus, Reservation Manager, Hotel Carter, 1012 Prospect Avenue, Cleveland 15, Ohio, indicating the type of accommodations required and the date of arrival. The rates are as follows:

| SINGLE | | | | | TWIN | | | |
|---|---|---|---|---|---|---|---|---|
| $4.00 | $5.00 | $6.50 | $7.00 | $7.50 | $8.00 | $9.00 | $10.00 | $11.00 |
| **DOUBLE** | | | | | **SUITES** | | | |
| $6.00 | $7.00 | $8.50 | $9.00 | $9.50 | $20.00 | $30.00 | | |

**SEE PROGRAM NEXT PAGE**

## ASM Preliminary Program

## *REFRACTORY TYPE MATERIALS FOR HIGH TEMPERATURE APPLICATIONS*

**NOVEMBER 24 and 25, 1952**

### MORNING SESSION - NOVEMBER 24
### (9:30 A.M. - 12:00 Noon)

**Main Subject: *Molybdenum and Its Alloys***

Arc Cast Molybdenum and Molybdenum-Base Alloys—Their Manufacture, Fabrication and Properties—R. M. Parke, General Electric Co. (10 min.)

Sintered Molybdenum and Molybdenum-Base Alloys—Their Manufacture, Fabrication and Properties—By Howard Scott, Westinghouse Electric Co. (10 min.)

**Related Discussion (5 min. each)**

(a) L. F. YNTEMA, Fansteel Metallurgical Corp.
(b) H. HANICK, Wright Aeronautical Co.
(c) K. DIKE, NACA

**Panel Session on Above Subjects* (30 Minutes)**

The Elevated Temperature Properties of Molybdenum and Molybdenum-Base Alloys—By Howard Cross, Battelle Memorial Institute. (10 min.)

Protective Coatings for Molybdenum or Molybdenum-Base Alloys—By Ralph Wehrmann, Fansteel Met. Corp. (15 min.)

**Related Discussion (5 min. each)**

(a) K. M. BARTLETT, Thompson Products, Inc.
(b) D. G. MOORE, Bureau of Standards
(c) R. I. JAFFEE, Battelle Memorial—(Cladding)

**Panel Session on Above Subjects* (30 Minutes)**

— Recess 12:00 o'clock —

### AFTERNOON SESSION - NOVEMBER 24
### (1:30 - 5:00 P.M.)

**Main Subject: *Ceramics and Intermetallics***

Ceramic Bodies for Use at Elevated Temperatures and Their Evaluations—By R. F. Geller, Bureau of Standards. (15 min.)

**Related Discussion (5 min. each)**

(a) F. K. DAVEY, Rutgers University
(b) G. M. BUTLER, Carborundum Co., or staff member
(c) TOM SHEVLIN, Ohio State University
(d) S. H. STUPAKOFF, Stupakoff Ceramic & Mfg. Co.
(e) N. P. THIELKE, Pennsylvania State College
(f) H. Z. SCHOFIELD, Battelle Memorial Institute

**Panel Session on Above Subjects* (30 Minutes)**

Intermetallics — New Type Refractory Alloys — By Louis Marchi or staff member, Armour Res. Foundation. (15 min.)

Molybdenum Disilicide, Properties at Elevated Temperatures —By W. Maxwell, NACA. (10 min.)

Titanium Disilicide, Properties at Elevated Temperatures—By R. Long, NACA. (10 min.)

Combinations of Carbides and Borides—Powder Ceramics—By Dr. Gordon Findley, Norton Co. (10 min.)

**Related Discussion (5 min. each)**

(a) R. SEELIG, American Electro Metals
(b) F. V. LENEL, R.P.I., Application of the Electrical Sintering Method to the Preparation of Ceramics and Intermetallics

**Panel Session on Above Subjects* (30 Minutes)**

### EVENING SESSION - NOVEMBER 24
### (8:00 to 10:00 P.M.)

**Main Subject: *Uses and Application of Refractory Type Materials***

Problems Relating to the Usage of Refractory Materials in High Temperature Applications—By J. B. Johnson and/or R. Paris. WADC. (15 min.)

Turbine Operation with Refractory Type Materials—By G. C. Duetsch, NACA. (15 min.)

**Related Discussion (5 min. each)**

(a) W. R. SHERIDAN, Bell Aircraft (Rocket Nozzles)
(b) R. THIELEMANN, Pratt & Whitney Aircraft
(c) E. PEKAREK, Thompson Products
(d) S. MANSON, NACA, Thermal Shock

**Panel Session on Above Subjects* (60 Minutes)**

### MORNING SESSION - NOVEMBER 25
### (9:00 A.M. - 12:00 Noon)

**Main Subject: *Ceramics and Intermetallics with Metal Additions***

Chairman: Dr. J. T. Norton, Massachusetts Institute of Technology

Theoretical Structure of Refractory Materials for Elevated Temperature Applications—By John T. Norton. (15 min.)

Additions of Metals or Alloys to Base Ceramic Type Materials —By Tom Shevlin, Ohio State University. (10 min.)

Infiltration of Intermetallic Type Bodies—By Claus G. Goetzel, Sintercast Corp. (10 min.)

**Related Discussion (5 min. each)**

(a) R. GURNICK, NACA
(b) J. R. TINKELPAUGH, N. Y. State College of Ceramics
(c) H. R. SPENDELOW, JR., Union Carbide and Carbon
(d) D. BENNETT, University of Illinois

**Panel Session on Above Subjects* (30 Minutes)**

New Developments on Titanium Carbide Compositions and Properties—By J. C. Redmond, Kennametal, Inc. (15 min.)

Elevated Temperature Properties of Zirconium Boride Alloys —By Frank W. Glaser, American Electro Metals (10 min.)

Alloys of Molybdenum Disilicide—By H. A. DeVincentis, NACA. (10 min.)

**Related Discussion (5 min. each)**

(a) R. WEHRMANN, Fansteel Metallurgical Corp.
(b) R. B. FISCHER, Battelle Memorial Institute
(c) W. L. HAVEKOTTE, Firth-Sterling Steel Co.
(d) J. J. HARWOOD, Office of Naval Research

**Panel Session on Above Subjects* (25 Minutes)**

**Session Closes at 12:00 Noon**

**Lunch to 1:30**

**Tour and Inspection of NACA, Lewis Flight Propulsion Laboratory at 2:15 - 4:30 P.M.**

**Panel sessions will be made up of chairman as moderator and all speakers.*

**ATTEND TO THIS TODAY →**

**IMPORTANT: TO BE RETURNED TO ASM VIA MILITARY SECURITY OFFICER ONLY**

Request for Clearance to Attend the

# CONFIDENTIAL SESSION ON

# "REFRACTORY-TYPE MATERIALS FOR HIGH-TEMPERATURE APPLICATIONS"

Sponsored by the American Society for Metals

**MONDAY AND TUESDAY, NOVEMBER 24 and 25, 1952**

**HOTEL CARTER—RAINBOW ROOM**

**CLEVELAND, OHIO**

American Society for Metals
7301 Euclid Avenue
Cleveland 3, Ohio

ATTENTION: Refractory Materials Committee

Gentlemen:

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Clearance is requested to attend the above confidential session.

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Birthplace____________________ Citizenship____________________

If birthplace not U. S., give details____________________

Company Affiliation and Address____________________

Applicant's Title or Position____________________

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If you have already been cleared for access to CONFIDENTIAL or higher classification of information please specify

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on____________________ in connection with____________________
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This request is based upon my need to know the information and material to be discussed at this meeting as necessary in the performance of my work and in the best interest of the military or other government services.

DATE____________________ APPLICANT'S SIGNATURE____________________

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# Discusses Cast Iron Metallurgy in Texas

*Ralph A. Clark (Center), Service Manager of Electro Metallurgical Corp., Who Spoke on "The Metallurgy of Cast Iron" at Last Meeting of the Texas Chapter, Is Shown With H. C. Dill, Chief Metallurgist, Hughes Gun Co., Chairman and M. W. Phair, Tennessee Coal & Iron Co., Vice-Chairman*

Reported by C. L. Horn
***Metallurgist, Hughes Gun Co.***

"The Metallurgy of Cast Iron" was discussed by Ralph A. Clark, service manager, Electro Metallurgical Co., at a recent Texas chapter meeting.

Mr. Clark stated that gray cast iron was still responsible for the majority of cast iron produced. Gray cast iron is desirable for certain applications because it is easy to cast, has high fluidity, is suitable for light section and intricate castings, has high dampening capacity and low shrinkage characteristics, has self-lubricating characteristics, is locally available, and is economical.

Gray cast iron is an alloy of iron, carbon and silicon, with carbon being the main controlling element as to the type and properties of the iron. Irons of different analyses can be compared by using their carbon equivalent. Carbon in cast iron is in the form of pearlite, graphite or carbide. Increased carbon equivalent increases the amount of graphitic carbon, decreasing hardness and strength. Carbon has a strong effect on the fluidity and castability of iron. The rate of solidification depends on carbon equivalent and section thickness, and must be considered.

Inoculation of cast iron results in random distribution of graphite and reduced chill depth. Also, with inoculation, lower carbon contents can be used to give higher strength irons.

Malleable iron is produced by rigidly controlling the silicon and carbon to produce white iron, which is subsequently annealed. Malleable iron has high ductility because the carbon present is in the form of aggregates of closely packed flakes of graphite which do not destroy the continuity of the matrix. With the addition of 0.04-0.08 magnesium, and under controlled conditions, a nodular graphite iron can be produced which is malleable and has high ductility as cast.

Silicon is a strong graphitizer and softener in gray iron. At the same time, it has a solution hardening effect on the matrix. In nodular iron it acts as a strengthener due to solution hardening.

Sulphur in the cupola charge is neutralized by the addition of manganese which forms manganese sulphide. If the sulphur is not neutralized, white iron will result. The amount of manganese added is usually five or six times the amount of sulphur present in the melting stock. Excess of manganese tends to stabilize the carbide.

Phosphorus gives considerable trouble by forming steadite, which has a low melting point and concentrates in the grain boundaries, which causes internal porosity.

Alloys are used in cast iron for practically the same reasons as in steel. Nickel increases tensile strength and Brinell hardness, and is often used along with chromium and molybdenum. Molybdenum gives increased strength and is a mild carbide stabilizer. It also has an effect on the form of graphite flakes which are present. Generally, better impact properties may be expected from cast iron containing molybdenum. Chromium hardens the iron and moderately increases the strength. It resists grain growth and retards oxidation, which results from repeated heating and cooling. The addition of vanadium to cast iron increases strength. Zirconium and titanium tend to produce primary ferrite which gives good machinability but low physical properties. The presence of tramp elements, such as aluminum, tin and antimony, may result in porosity. More than a trace of tin can produce internal chill, brittleness, and stress cracking in cast iron.

Mr. Clark discussed the design and construction of the cupola and outlined some experimental work which is being done. Most of the cast iron melting today is done in an acid-lined cupola, but some work is being done with a basic-lined cupola to reduce sulphur content. Hotter blast temperatures than normal are used to increase the over-all efficiency of cupola operation. Some of the furnaces where hot blasts are used have water-cooled linings. Work is done with electric furnaces to blend and mix the iron to give a superheated effect, and other work is being done with air furnaces.

## Honeywell Steps Up Jet Research With New Lab

A new jet engine laboratory, believed to represent the most comprehensive analog work ever attempted by a control manufacturer, is being established by the aeronautical division of Minneapolis-Honeywell Regulator Co., to speed development work on jet engine controls.

Equipped with a network of highly complex electronic computers, controllers and relays, the new facilities, which include a separate building for this work, will permit jet controls to be designed and proved without ever leaving the ground. Not even an engine will be needed.

Time-consuming and expensive flight tests during development will be eliminated, and the company's engineers will be able to acquire much more test data than previously possible, and cut down on research time as well.

The electronic system, heart of which is the analog computor, makes it possible to simulate the characteristics of any jet engine under all flight conditions. Controls performance is recorded automatically.

## Southern Chapters To Hold Nuclear Energy Meeting

The annual ABCOR (Atlanta-Birmingham-Chattanooga and Oak Ridge Chapters) district meeting will be held in Oak Ridge, Tenn., on Sept. 18 and 19, 1952. The meeting topic will be "Nuclear Energy and Its Unique Metallurgical Problems".

The technical sessions will include:

1. **Metallurgical Problems of Nuclear Energy,** by Joseph E. Burke, director, Metallurgy Division, Knolls Atomic Power Laboratory, Schenectady, N. Y.

2. **Factors in Reactor Material Selections,** by G. E. Evans, Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tenn.

3. **Effect of Nuclear Reactor Radiation on the Properties of Metals,** by D. S. Billington, director, Physics of Solids Division, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Also to be included in the program is an unclassified tour of the Oak Ridge National Laboratory.

## IMPORTANT MEETINGS

### *for October*

**Sept. 30-Oct. 3—Association of Iron and Steel Engineers.** Annual Convention and Iron and Steel Exposition. Public Auditorium, Cleveland, Ohio. (T. J. Ess, Managing Director, A.I.S.E.. 1010 Empire Bldg., Pittsburgh 22, Pa.)

**Oct. 1-3—National Association of Corrosion Engineers.** South Central Regional Meeting. Jung Hotel, New Orleans, La. (A. B. Campbell, Executive Secretary, N.A.C.E., 1061 M & M Bldg., Houston 2, Texas)

**Oct. 9-11—Optical Society of America.** Thirty-Seventh Annual Meeting. Hotel Statler, Boston, Mass. (Arthur C. Hardy, Secretary, O.S.A., Massachusetts Institute of Technology, Cambridge 39, Mass.)

**Oct. 10-11—American Society of Tool Engineers.** International Area Meeting. Statler Hotel, Buffalo, N. Y. (Harry E. Conrad, Executive Secretary, A.S.T.E., 10700 Puritan Ave., Detroit 21, Mich.)

**Oct. 15-17—Scientific Apparatus Makers Association.** Midyear Meeting of Recorder-Controller Section. Seaview Country Club, Absecon, N. J. (Donald F. McCammon, Director of Public Relations, S.A.M.A., 20 North Wacker Drive, Chicago 6, Ill.)

**Oct. 15-17—Canadian Institute of Mining and Metallurgy.** Annual Western Meeting. Winnipeg, Man., Canada. (C. Gerow, Secretary-Treasurer, C.I.M.M., 906 Drummond Bldg., Monreal 2, Que., Canada)

**Oct. 16—American Iron and Steel Institute.** Pittsburgh Regional Meeting. Hotel William Penn, Pittsburgh, Pa. (George S. Rose, Secretary, A.I.S.I., 350 Fifth Ave., New York 1, N. Y.)

**Oct. 16-17—Gray Iron Founders' Society, Inc.** Annual Meeting. Cleveland, Ohio. (C. O. Burgess, Technical Director, G.I.F.S., 210 National City-East 6th Bldg., Cleveland 14, Ohio)

**Oct. 16-18—American Ceramic Society.** Pacific Coast Regional Meeting. Olympic Hotel, Seattle, Wash. (Charles S. Pearce, Secretary, A.C.S., 2525 North High St., Columbus 2, Ohio)

**Oct. 19-23—American Institute of Electrical Engineers.** Fall General Meeting. New Orleans, La. (H. H. Henline, Secretary, A.I.E.E., 33 West 39th St., New York 18, N. Y.)

**Oct. 22-24—Porcelain Enamel Institute.** Annual Meeting. The Greenbrier, White Sulphur Springs, W. Va. (John C. Oliver, Secretary, P.E.I., Denrike Bldg., 1010 Vermont Ave., N. W., Washington 5, D. C.)

**Oct. 22-25—National Tool & Die Manufacturers Association.** Annual Convention. Sheraton Hotel, Rochester, N. Y. (George S. Eaton, Executive Secretary, N.T.D.M.A., 906 Public Square Bldg., Cleveland 13, Ohio)

**Oct. 27-30—American Gas Association.** Annual Convention. Atlantic City, N. J. (M. A. Combs, Secretary, Industrial and Commercial Gas Section, A.G.A., 420 Lexington Ave., New York 17, N. Y.)

**Oct. 27-29—American Gear Manufacturers Association.** Semi-Annual Meeting. Edgewater Beach Hotel, Chicago, Ill. (John C. Sears, Executive Secretary, A.G.M.A., Empire Bldg., Pittsburgh 22, Pa.)

**Oct. 27-31—Gas Appliance Manufacturers Association.** Exhibition. Atlantic City, N. J. ( H. Leigh Whitelaw, Secretary, G.A.M.A., 60 East 42nd St., New York 17, N. Y.)

**Oct. 27-31—Electrochemical Society, Inc.** General Meeting. Mt. Royal Hotel, Montreal, Que., Canada. (H. B. Linford, Secretary, E.S., 235 West 102nd St., New York 25, N. Y.)

**Oct. 28—Association of Consulting Chemists and Chemical Engineers, Inc.** Annual Symposium. Hotel Belmont Plaza, New York (Secretary, A.C.C.C.E., 50 East 41st St., New York 17, N. Y.)

# CHAPTER MEETING CALENDAR

| CHAPTER | DATE | PLACE | SPEAKER | SUBJECT |
|---|---|---|---|---|
| Akron | Oct. 15 | Mayflower Hotel | Norman Kates | Minimizing Heat Treating Headaches |
| Birmingham | Sept. 18-19 | Oak Ridge National Laboratory | | Joint ABCOR Meeting (Georgia, Birmingham, Chattanooga, Oak Ridge Chapters) |
| Boston | Sept. 20 | Peabody Country Club | | Annual Outing |
| | Oct. 3 | Hotel Shelton | Fletcher | Toolsteels |
| Buffalo | Oct. 9 | Ford Motor Co. | | Plant Visit—Buffalo Stamping Works |
| Cant.n-Massillon | Oct. 7 | Mergus Restaurant | | Opening Fellowship Meeting |
| Chattanooga | Sept. 18-19 | Oak Ridge National Laboratory | | (See Birmingham Chapter) |
| Chicago | Oct. 13 | Furniture Mart | W. E. Thill | Prospects of an Everlasting Sleeve Bearing |
| Cincinnati | Oct. 9 | Engineering Society | L. P. Tarasov | Metallurgical Aids to Better Grinding |
| Georgia | Sept. 18-19 | Oak Ridge National Laboratory | | (See Birmingham Chapter) |
| | Oct. 6 | Atlantic Steel Co. | Lewis Peek | Machine Tools |
| Fort Wayne | Oct. 13 | Howard Johnson's | Ralph Wehrmann | Metal Coatings |
| Indianapolis | Sept. 15 | McClarney Restaurant | R. H. Aborn | Metallurgy of Ferrous Welding With Emphasis on Recent Developments |
| Inland Empire | Oct. 1 | | R. B. Mears | Designing to Prevent Corrosion |
| Louisville | Oct. 7 | Korfhage's Tavern | John Hollomon | Defects and Deformations |
| Milwaukee | Sept. 16 | City Club | John Mitchell | What Steels Can We Use |
| | Oct. 14 | City Club | Frank L. LaQue | Progress in Conquering Corrosion |
| New Haven | Oct. 16 | Towne House | Dr. Kaufmann | Metals in the Development of Atomic Power |
| New Jersey | Sept. 15 | | Ralph L. Wilson | Current Development in Alloy Steels |
| New York | Oct. 17 | Hotel New Yorker | | Annual Smoker |
| Notre Dame | Oct. 8 | Engineering Bldg. | John Mitchell | Alloy Steels, Past, Present and Future |
| Oak Ridge | Sept. 18-19 | Oak Ridge National Laboratory | | (See Birmingham Chapter) |
| Ottawa Valley | Oct. 7 | Physical Metallurgy Research Laboratory | H. Thomasson | Boundary Zone Factor in Arc Welding |
| Penn State | Sept. 30 | | | Social Meeting |
| | Oct. 14 | | O. W. Simmons and R. E. Edelman | Titanium Casting |
| Philadelphia | Sept. 19 | Temple University | Weber de Vore | How to Make Cold Steel Flow |
| | Oct. 10 | Engineers Club | Henry White | Quality Control as Related to the Foundry |
| | | | Edward Schrock | Quality Control as Related to the Steel Mill |
| Pittsburgh | Oct. 9 | Roosevelt Hotel | H. W. Johnson | Andrew Carnegie Lecture |
| Puget Sound | Oct. 6 | Seattle | R. B. Mears | Designing to Prevent Corrosion |
| Purdue | Sept. 23 | Fairfield Mfg. Co. | H. J. Bates | Current Problems in Gear Manufacturing—Plant Visit |
| | Oct. 14 | Purdue Union | Isabel Joyce | Design and Manufacture of Jewelry—Family Night |
| Rhode Island | Oct. 1 | Foxboro Co., Foxboro, Mass. | | Plant Visit |
| Rocky Mt. Pueblo Group | Sept. 17 | Minnequa Club | F. L. LaQue | Corrosion |
| Saginaw Valley | Oct. 14 | Frankenmuth, Mich. | John Mitchell | Historical Aspects of and Conservation in Constructional Alloy Steels |
| Springfield | Sept. 15 | Springfield, Vt. | Porter R. Wray | Boron Steels, Selection and Heat Treatment |
| | Oct. 13 | Westinghouse Auditorium, Springfield, Mass. | | Metal Joining (Joint Meeting With A.S.T.E.) |
| St. Louis | Sept. 19 | Forest Park Hotel | C. C. Helmle | Adhesion of Electrodeposits and New Methods of Cleaning and Removal Oxide |
| | Oct. 17 | Forest Park Hotel | John R., Willard | Recent Developments in the Use of Aluminum and Its Alloys |
| Syracuse | Oct. 7 | Onondaga Hotel | George H. Brumbach | Present Trends in High Temperature Alloys |
| Texas | Oct. 7 | Ben Milam Hotel | Earle M. Jorgensen | Reminiscences of a Steel Peddler |
| Tri-City | Oct. 7 | Rock Island Arsenal | R. D. Haworth, Jr. | Wear Resistance—Selection of Materials and Treatment |
| Utah | Sept. 25 | Hot Shoppes Cafe | F. A. Christensen | Industrial Diamonds |
| Washington | Oct. 13 | | | Quench and Draw Party |
| Worcester | Oct. 8 | Hickory House | Carl G. Johnson | Metal Parts From Metal Powders |

# A. S. M. Review of Current Metal Literature

*An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month*

**Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio**

*W. W. Howell, Technical Abstracter*

Assisted by Joseph Enke, Elizabeth Volpe and Members of the Translation Group

## A GENERAL METALLURGICAL

**272-A. Australia in Relation to the Iron and Steel Industry.** R. H. M. Rowe. *Australasian Engineer,* May 7, 1952, p. 50-54.

An address. Ore resources; main plants. (A4, B10, Fe, ST)

**273-A. The Outlook for Key Commodities.** *Chemical and Engineering News,* July 21, 1952, p. 2983-2986.

Third of four articles based on reports of the President's Materials Policy Commission. Ferrous and nonferrous metals, miscellaneous strategic materials and nonminerals. (A4)

**274-A. The Crisis in Raw Materials.** *Fortune,* v. 46, Aug. 1952, p. 114-117, 160, 163-164, 166-168, 170.

Condensed from a 5-volume report by the President's Materials Policy Commission. (A4)

**275-A. South Africa Expands Steel Production.** *Iron and Steel Engineer,* v. 29, July 1952, p. 135, 138.

The general status of steel production in South Africa, citing early phases of development. (A4, ST)

**276-A. The Functions of the Government Metallurgical Laboratory.** L. Taverner. *Journal of the Chemical Metallurgical and Mining Society of South Africa,* v. 52, Apr. 1952, p. 225-236; disc., p. 236-240.

Facilities and work of laboratory located in Johannesburg, South Africa. (A9)

**277-A. United States Trade in Ores and Metals.** *Metal Age,* July 1952, p. 3-10.

Text and tables. (A4)

**278-A. Ion Exchange—a New Technique for Metallurgists.** Bernard Ostrof and Ernest E. Thum. *Metal Progress,* v. 62, July 1952, p. 67-74.

Ion exchange in general. Applications for purification of $H_2O$ and Cr electroplating solutions; recovery of Fe, Cr, Mn, Cu, Zn, and acid from pickling liquors; separation of rare earths; and purification of Zr from Hf. Diagrams and photographs. (A8, L17, L12, C26)

**279-A. A New Research and Engineering Laboratory.** R. W. Schlumpf. *Metal Progress,* v. 62, July 1952, p. 79-83.

Laboratory of Hughes Tool Co., Houston, Tex. (A9)

**280-A. U. S. Annual Aluminum Supply of 4 Billion Pounds Seen From Primary Output, Scrap Intake, Imports.** David P. Reynolds. *Metals,* v. 23, July 1952, p. 7-9.

Opinions of vice-president, Reynolds Metals Co. (A4, Al)

**281-A. Gold Ore Production and Costs of 16 Canadian Firms in 1951.** David N. Skillings. *Skillings Mining Review,* v. 41, July 19, 1952, p. 1-2.

Operations of each company briefly summarized. Data tabulated. (A4, Au)

**282-A.** (French.) **Metallurgical Techniques Applied to Archaeology.** Albert France-Lanord. *Revue de Métallurgie,* v. 49, June 1952, p. 411-422.

Includes sections on fabrication of ancient swords and on corrosion and conservation of ancient bronzes. Numerous illustrations. 18 ref. (A2, R general, ST, Cu)

**283-A.** (German.) **Work of the Verein Deutscher Eisenhüttenleute in 1951.** *Stahl und Eisen,* v. 72, June 19, 1952, p. 733-758.

Extensive review of organization and research of German iron and steel organization. 223 ref. (A9, Fe, ST)

*The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.*

**284-A. Aluminium Limited: Little Brother Grows Up.** *Business Week,* July 26, 1952, p. 82-84, 86-88, 90.

Deals with the economic status of Al in Canada, stressing the position and importance of Aluminium Limited of Montreal. (A4, Al)

**285-A. Extinguishing Magnesium Fires With Boron Trichloride.** *Foundry,* v. 80, Aug. 1952, p. 257-259.

Boron trichloride was found to be effective in extinguishing magnesium fires in heat treating, preheating and annealing furnaces. It is convenient to use because it vaporizes readily and is therefore easily applied. The chemical reaction involved which makes it a good extinguisher. (A7, J general, Mg)

**286-A. A Recording Dust Meter.** B. O. Smith and S. S. Carlisle. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 273-276.

The instrument gives a continuous record which, generally, is a qualitative measure of the dust level. It uses a light-scattering technique in which a photo-electric cell measures the light scattered by dust particles in a direction normal to the illuminating beam. The scattered light flux, inferred from the photocell current, is taken as a measure of dust concentration. Results obtained in a series of trials on blast-furnace gas. Graphs, drawings, and circuit diagram. 11 ref. (A5)

**287-A. Treatment of Copper Roaster Reverberatory Flue Dust.** A. J. Kroha and J. A. Finley. *Mines Magazine,* v. 62, July 1952, p. 40-42, 58.

Experimental tests on extraction of Cu and Pb from flue dust. A sulfatizing roast followed by an acid leach extracted the Cu but the Pb was unaffected. Chloridized roasting followed by acid-brine leach gave excellent extraction of both Cu and Pb. Flotation tests showed high reagent consumption for cement Cu and sulfide Cu and necessitated an additional circuit for recovery of oxidized Cu and Pb. (A8, C21, Cu, Pb)

**288-A. Resources for Freedom.** *Mining World,* v. 14, Aug. 1952, p. 42-47.

A resumé of the President's Materials Policy Commission report. Evaluates metals and mineral uses and needs, estimates 1975 consumption, and recommends methods to prevent shortages. Special consideration is given to iron and ferro-alloys and to nonferrous metals. (A4)

**289-A. Outside Facilities Extend Scope of Industry Research.** Benjamin Melnitsky. *Steel,* v. 131, Aug. 4, 1952, p. 96-98.

How basic and applied research problems of many companies are being solved by universities, trade associations, and government agencies. Summary list outlines sources. (A9)

**290-A. Wet Dust Recovery: Big Tonnage Returns.** Martin L. Cover. *Steel,* v. 131, Aug. 11, 1952, p. 98, 101-102, 104, 106, 109.

How wet dust from blast furnaces is recovered in the form of sludge, made into filter cake, and recharged as sinter. Layout for wet flue-dust recovery plant. (A8, D1)

**291-A. South African Iron and Steel Industrial Corporation Limited.** *Steel Equipment & Maintenance News,* v. 5, July 1952, p. 6-8.

Equipment and facilities. (A5, ST)

**292-A. Review of Iron and Steel Literature for 1951.** V. S. Polansky. *Blast Furnace and Steel Plant,* v. 40, July 1952, p. 793-800.

35th annual review list. Concerned only with separately published books and pamphlets. (To be continued.) (A10, Fe, ST)

**293-A. Metallurgical Activities at Frankford Arsenal.** Daniel J. Murphy. *Metal Progress,* v. 62, Aug. 1952, p. 67-72.

Basic metallurgical research in mechanical metallurgy, structure of metals, and foundry. Process research in fabrication of metals, welding, corrosion and heat treatment. Special problems in brass and steel cartridge cases and armor-piercing shot. (A9, T2)

**294-A. Westinghouse Electric Correlates Its Product Development With Research.** John Parina, Jr. *Metal Progress,* v. 62, Aug. 1952, p. 73-78.

Development of magnetic materi-

als, high-temperature alloys, investment castings, shell molding, mechanical properties. (A9)

**295-A. Economy in Steel Alloying Elements; Guide to Alloy Steel Direction.** *Metallurgia,* v. 46, July 1952, p. 31-32.

Guide to use of a new British government directive. (A4, AY)

**296-A. Alcan's Aces: Cheap Hydro Power.** *Steel,* v. 131, Aug. 18, 1952, p. 76-77.

Supplier of 1/4th of the world's aluminum taps Canada's abundant hydroelectric potential to feed power-hungry smelters at a cost that can't be matched in the U. S. (A4, C21, Al)

**297-A.** (Book) **Elementary Metallurgy.** Ed. 2. W. T. Frier. 258 pages. 1952. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $4.50.

Somewhat enlarged by the incorporation of new developments within the field. A practical, easily understood analysis of elementary metallurgy. (A general)

**298-A.** (Book) **An Outline of Metallurgical Practice.** Ed. 3. Carle R. Hayward. 728 pages. 1952. D. Van Nostrand Co., 250 4th Ave., New York 3, N. Y. $10.00.

Essential facts about metallurgical practice from mine to finished product. Many sections are completely rewritten. New ones have been added to cover recent developments. Brief chapters added on titanium and uranium. The treatment of secondary metals reflects their increasing importance. More than 400 illustrations, about a third of which are entirely new. (A general)

**299-A.** (Book) **Statistical Year Book for 1951.** 119 pages. British Iron and Steel Federation, Steel House, Tothill St., London, S.W. 1, England. 7s, 6d.

Information concerning the iron and steel industry in the United Kingdom. Besides iron and steel production, finished steel deliveries, and the use of raw materials, the tables give details regarding imports and exports, prices, stocks, and employment in the industry. (A4, Fe, ST)

**300-A.** (Book—German.) **Metallkunde. I. Aufbau der Metalle und Legierungen. II. Eigenschaften. Grundsätze der Form- und Zustandsgebung.** (Metallurgy. I. Structure of Metals and Alloys. II. Properties. Principles of Modification of Form and Structure.) Ed. 2. Heinz Borchers. 110 and 154 pages. 1950 and 1951. Walter de Gruyter & Co., Berlin 3, Germany. 2.40 DM per vol.

A digest-type account for the non-metallurgist, of physical metallurgy for engineers. Vol. I: Crystalline structure and nature of single-phase and polyphase systems; the meaning of an equilibrium diagram; numerous examples of the diagrams of the commoner alloys. Vol. II: Physical properties and how these are affected by temperature, composition, etc. Casting, spraying, sintering of powder, heat treatment, forging, cutting, and machining. Illustrations and diagrams; indexes and bibliographies. (A general)

# B

## RAW MATERIALS AND ORE PREPARATION

**282-B. The Rod Mill in the Sullivan Flow.** H. R. Banks. *Canadian Mining and Metallurgical Bulletin,* v. 45, July 1952, p. 397-403; disc., p. 403; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 255-261, disc., p. 261.

Summarizes work of the rod mill through the first 5,000,000 tons and shows that the wear is definitely below normal. Consumption of steel, power, and other operating data. Observations on the principles involved in comminution. Material is galena. Photographs and tables. (B13, Pb)

**283-B. Sulphur Elimination; The Use of Sulphur as Fuel in the Sintering of Iron Ores.** R. A. Elliot. *Canadian Mining Journal,* v. 73, July 1952, p. 51-56.

History, experimental apparatus and procedure, and results. Tables and illustrations. (B16, Fe)

**284-B. Refractories for 4000° F. and Higher.** Gordon R. Finlay. *Chemistry in Canada,* v. 4, Mar. 1952, p. 41-43.

Reviews the field of special refractories and includes considerable new data. Possible applications of the refractory carbides, nitrides, and borides include crucibles, jet nozzles, refractory liners, and arc or electrolytic electrodes. (B19)

**285-B. U. S. Steel Fuels 60,000-Kw Unit With Blast Furnace Gas.** W. P. Palmer. *Electrical World,* v. 138, July 28, 1952, p. 81-83.

New unit at U. S. Steel Co.'s South Works is largest ever designed for burning blast-furnace gas. It operates on steam at 850 psi., 900° F. Diagrams and illustrations. (B18)

**286-B. The Chlorination of Olivine Ore.** H. H. Greenfield and R. W. Moulton. *Trend in Engineering at the University of Washington,* v. 4, July 1952, p. 22-24, 28.

Equipment, procedures, and results of experimental study of the process—a step in the possible recovery of Mg from olivine. (B14, Mg)

**287-B. Sunshine Lardeau; Newest B. C. Base-Metal Producer.** R. C. Glen. *Western Miner,* v. 25, July 1952, p. 44-46.

New Pb-Zn concentrator. Au and Ag are also produced. Equipment and ore beneficiation. (B14, Pb, Zn, Au, Ag)

**288-B.** (French.) **Measurement of the Viscosity of Synthetic Slags With a High Ferrous Oxide Content. Parts I and II.** G. Urbain. *Journal de Chimie Physique et de Physico-Chimie Biologique,* v. 49, May 1952, p. 308-322.

Proposes a new method for measurements on above slags, using optical pyrometry. Experimental results. Data are tabulated and charted. 75 ref. (B21)

**289-B.** (French.) **The Italian Aluminum Industry. Part One. Minerals. Part Two. The Metal.** G. A. Baudart. *Revue de l'Aluminium,* v. 29, May 1952, p. 171-173; June 1952, p. 217-219.

Includes map and production data. (B10, Al)

**290-B.** (German.) **Experiments on the Beneficiability of the Antimony Ores of Oberböhmsdorf.** Eugen von Szantho. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, June 1952, p. 234-236.

Flotation experiments show that above ores can be easily floated to produce concentrates containing 60% Sb with better than 80% extraction. (B14, Sb)

**291-B. Antimony Deposits of Tuscany.** G. Dessau. *Economic Geology and the Bulletin of the Society of Economic Geologists,* v. 47, June-July, 1952, p. 397-413.

Three deposits, Poggio Fuoco, Tafone, and Montauto are described in detail; others are covered more briefly. Tables and maps. 12 ref. (B10, Sb)

**292-B. Satellite Europe's Mineral Position.** John M. Warde. *Engineering and Mining Journal,* v. 153, Aug. 1952, p. 84-89.

Mineral production in the Russian satellite countries of Europe: East Germany, East Austria, Poland, Czechoslovakia, Romania, Bulgaria, and Albania. Includes map of mineral deposits and iron and steel centers. (B10)

**293-B. Can the U. S. Use Its Low-Grade Domestic Chrome Ore?** H. A. Doerner. *Engineering and Mining Journal,* v. 153, Aug. 1952, p. 90-92.

Surveys U. S. Cr resources. Methods of upgrading, and the question of whether upgrading is necessary. An abstract of a report by D. H. Ruhnke of Republic Steel Corp. indicates that lower grade ferrochromium may be satisfactory for steelmaking. (B22, D general, Fe-n, Cr)

**294-B. Nchanga's New Copper Leach Plant.** *Engineering and Mining Journal,* v. 153, Aug. 1952, p. 93. (From report by H. L. Talbot in *Optima,* a quarterly review published by Anglo American Corp.)

Includes flow diagram for above South African plant. Crushing, grinding, classification, leaching, thickening, ball milling, flotation, electrolysis, and casting. (B13, B14, Cu)

**295-B. Cupola Coke: With Particular Reference to High-Ash Coke.** A. G. L. Lewis. *Foundry Trade Journal,* v. 93, July 24, 1952, p. 89-93.

Cupola coke in Southern Africa contains more than 0.15% ash, which is about double the ash content of cokes produced in the Northern Hemisphere. A similar position prevails in Australia and India. The ash content of American and European coke tends to rise. Attention is also drawn to a world-wide tendency—fluctuations in coke quality. The effect of high-ash coke and variations in coke quality on the production of iron castings from cupola melts and methods of dealing with these effects. (B18, E10)

**296-B. Considerations on the Effect of Ash and Clinker in the Iron and Steel Industry.** Neil H. Turner. *Journal of the Institute of Fuel,* v. 25, July 1952, p. 187-188.

Effect in blast-furnace coke, for producer-gas production, and in coal for firing steam locomotives and cranes. (B18, ST)

**297-B. Titanium—Its Occurrence and Uses.** Graham Oldham. *Mining Journal,* v. 239, July 18, 1952, p. 68-69. (B10, T general, Ti)

**298-B. Non-Ferrous Metal Resources in North Wales.** S. Dawson Ware. *Mining Magazine,* v. 88, July 1952, p. 15-20.

A survey. (B10, EG-a)

**299-B. India Ups Manganese Production to Supply "Free World" Market.** *Mining World,* v. 14, Aug. 1952, p. 34-37.

Economic status and supply of Mn in India. Geology of the deposits, geographical distribution, grades of ore, prospecting and mining, beneficiation and marketing and export. Tables, photographs, and map. (B10, Mn)

**300-B. Specular Hematite Pilot Plant.** *Mining World,* v. 14, Aug. 1952, p. 51.

M. A. Hanna Co., Groveland, Mich., pilot plant for Menominee Range ore. Equipment and methods include Humphrey's spirals, magnetic separation, and flotation. (B14, Fe)

**301-B. The Inferno Tamers.** Richard Cheney. *Steelways,* v. 8, July 1952, p. 21-24.

Refractories and their use for confining molten metals and glass. Manufacture and testing. (B19)

**302-B. Corrosion of Refractory Materials.** *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 921-925, 927. (Translated by Helen Towers from *Berichte der Deutschen Keramischen Gesell-*

*schaft und des Vereins Deutscher Emailfachleute,* v. 29, 1952)
Chemical and physical factors, critical review of work done during 1940-1950. Scope is confined to work done in Great Britain with occasional references to American literature. Extensive reference to service in metallurgical furnaces. 26 ref. (B19)

**303-B. Nitride Crucibles.** *Metal Progress,* v. 62, Aug. 1952, p. 160, 162. (Condensed from "Preparation of Crucibles From Nitrides", L. S. Foster, *U. S. Atomic Energy Commission,* AECD-2942, July 1945.)
Selection of material, with greatest emphasis on Ti and Zr nitrides. Production of crucibles. (B19)

**304-B. Spirals Recover Heavy Mineral By-Product—Kings Mountain, N. C.** W. R. Hudspeth. *Mining Engineering,* v. 4, Aug. 1952, p. 767.
Foote Mineral Co.'s method for recovering cassiterite and columbite chiefly, while producing spodumene concentrate. (B14, Sn, Cb)

**305-B. High-Efficiency Desliming by Use of Hydraulic Water Additions to the Liquid-Solid Cyclone.** D. A. Dahlstrom. *Mining Engineering,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 788-793.
Feasibility of hydraulic water cyclones as fine-size classifiers. Desliming coefficients of 0.3 or less are obtainable and the operation can be done in one piece of equipment. Tables. 10 ref. (B14)

**306-B. Measurement and Evaluation of the Rate of Flotation as a Function of Particle Size.** T. M. Morris. *Mining Engineering,* v. 4, Aug. 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 193, 1952, p. 794-798.
Experimental procedure included laboratory batch tests on cleaned concentrate Cu ore, Cu particles, and plant classifier overflow; and tests on samples from a 10-cell plant flotation machine floating pyrite. The two different types of actions taking place. Tables and graphs. (B14, Cu)

**307-B.** (Book) **Sources of Iron Ore in Asia.** Joseph F. Harrington and Benjamin M. Page. 176 pages. 1952. Office of Technical Services, U. S. Dept. of Commerce, Washington, D. C. (Report 154, Natural Resources Division, Economic and Scientific Section, General Headquarters, Supreme Commander for the Allied Powers, Tokyo.)
A regional picture of the known, important iron-ore deposits in East Asia. Data confined to the most essential factors necessary to determine the importance and place of a deposit in the regional economic pattern. Quantity and quality of ore, geology, mining methods, metallurgy, transportation, and history. Maps, charts, and tables. (B10, Fe)

# C

## NONFERROUS EXTRACTION AND REFINING

**119-C. How High Vacuum Aids Metalworking.** Frank Charity. *American Machinist,* v. 96, July 21, 1952, p. 102-103.
How modern equipment makes high vacuum a practical production tool. Applications include inert-atmosphere sintering, heat treating, brazing, or melting; impregnation or sealing of castings, etc., packaging in airtight containers; and application of metallic coatings. Diagram and illustrations. (C25, E25, J general, K8, L general)

**120-C. Calculated Energy Requirements of Electric Furnace Products.** Gordon R. Finlay. *Chemistry in Canada,* v. 4, Feb. 1952, p. 25-28.
Minimum requirements of power are calculated for fusion of oxides and for synthesis of carbides. Previously published data on silicon carbide are revised and corrected. Energy required in kwh. per lb. of product for fusion of $Al_2O_3$, MgO, and $ZrO_2$; for the purification of $Al_2O_3$ from bauxite and $ZrO_2$ from zircon sand; and for synthesis of TiC, ZrC, $B_4C$, SiC and ferrosilicon from the appropriate oxides. 17 ref. (C21)

**121-C. Researches on Nickel Converter Practice.** *Mining Journal,* v. 239, July 4, 1952, p. 13-14.
Different converter procedures, variations in handling nickel and cupronickel matte, and electrically heated converters. (C21, Ni)

**122-C.** (French.) **New Method for Pyrometallurgical Recovery of Metals of the Rare-Earth Group.** C. Decroly, J. Van Impe, and D. Tytgat. *Revue de Métallurgie,* v. 49, June 1952, p. 458-462.
Experimental technique. Separation of oxides and reduction of fluorites of rare earths. Data are tabulated. 10 ref. (C21, EG-g)

**123-C.** (German.) **The Use of Gas in the Heating of Light-Metal Furnaces.** A. Roth and H. W. Fulda. *Giesserei,* v. 39, June 2, 1952, p. 315-317.
Role in production of Al. Various technical advances, such as continuous casting, with reference to their effect on use of gas for heating the furnaces. Suggestions for the most economical use of this fuel. (C21, C5, Al)

**124-C. Ion Exchange Separation of Rhenium From Molybdenum.** S. A. Fisher and V. W. Meloche. *Analytical Chemistry,* v. 24, July 1952, p. 1100-1106.
Describes method of Re recovery which is 99±3% complete. Ion exchange provides a means by which Re is not only separated from Mo but also concentrated and recovered in a form easily converted to a useful crystalline compound. The method is also readily adaptable to colorimetric determination. Graphs and tables. 14 ref. (C28, S11, Re)

**125-C. El Paso Refinery of Phelps Dodge Refining Corporation.** B. B. Kunkle. *Mines Magazine,* v. 62, July 1952, p. 25-29, 59.
Electrolytic copper refinery. Flow sheet and details of equipment and procedures, including casting of anodes, bars, and ingots. (C23, Cu)

**126-C. Cyanidation.** Albert L. Pierce. *Mines Magazine,* v. 62, July 1952, p. 33-39.
Details of process used in production of gold and silver. Many of the techniques and machines developed for the cyanide process have been adapted to the hydrometallurgy of other metals, chemical processes, sewage disposal, water handling, and even flotation. Includes chemistry as well as mechanical features of the process. Schematic diagrams. (C24, Au, Ag)

**127-C. Horizontal or Vertical Retorts For Zinc Distillation?** C. W. Jensen. *Mining Magazine,* v. 88, July 1952, p. 20-23.
Reviews the case for replacement of the old horizontal retort. (C22, Zn)

**128-C.** (French.) **The Direct Production of Tungsten Monocarbide, WC, From Tungsten Ore.** André Chrétien, William Freundlich, and Francois-André Josien. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 30, 1952, p. 2608-2609.
Method in which a common tungsten ore known as wolframite is heated with carbon followed by treatment with hydrofluoric acid and aqua regia. This method is claimed to be very simple and rapid. Graphs. (C4, W, C-n)

**129-C. Titanium Dioxide Out of Quebec.** C. V. Hotson. *Canadian Metals,* v. 15, July 1952, p. 18-19.
See abstract of "Chemistry Tackles Titanium," *Canadian Chemical Processing,* item 130-C, 1952. (C21, B12, Ti)

**130-C. Chemistry Tackles Titanium.** C. V. Hotson. *Canadian Chemical Processing,* v. 36, June 1, 1952, p. 30-31.
Production, at Quebec Iron and Titanium Corp., Sorel, Quebec, of a high-$TiO_2$-content slag for paint manufacture. Mining and smelting operations. Possibility of Ti metal production. (C21, B12, Ti)

**131-C.** (Book—Russian.) **Metallurgiia Magniia** (The Metallurgy of Magnesium) Kh. L. Strelets, A. Iu. Taits, and B. S. Gulianitskii. 491 pages. 1950. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R.
Characteristics of the raw material used for obtaining magnesium, theoretical bases of the extractive metallurgy of magnesium, and the technology of its production by electrolytic and thermal methods. (C23, C21, Mg)

# D

## FERROUS REDUCTION AND REFINING

**310-D. Continuous Working With Producer Gas.** E. Wood. *British Steelmaker,* v. 28, July 1952, p. 358-362.
Design of furnaces at the new melting shop of Round Oak Steel Works, Ltd. Diagrams. (D2)

**311-D. The Manufacture of Sponge Iron in Sweden.** *Chemical Age,* v. 67, July 5, 1952, p. 19-22.
Procedures and equipment. (D8, Fe)

**312-D. Is Pre-Openhearth Desulfurization Practical?** C. E. A. Shanahan. *Iron Age,* v. 170, July 17, 1952, p. 136-137.
Various desulfurization practices. British studies of refining treatments, both before and after the openhearth, indicate that Mn, P, and Si can be better removed in the mixer if there is increased agitation. (D2, ST)

**313-D. Viscosity Control of Fuel for Open Hearth.** Harvey Krouse. *Iron and Steel Engineer,* v. 29, July 1952, p. 78-84; disc., 85-86.
Effects of viscosity control on combustion and fuel efficiency in the openhearth. Numerous graphs and schematic drawings. (D2, ST)

**314-D. Open Hearth Dust Control.** Stephen Vajda. *Iron and Steel Engineer,* v. 29, July 1952, p. 111-119; disc., p. 119-120.
The six basic types of gas-cleaning units available for openhearth dust control. Test experiment on each. (D2, A5)

**315-D. Calculations on Carbon Hearths for Blast Furnaces.** E. W. Voice. *Iron and Steel Engineer,* v. 29, July 1952, p. 125-128.
Optimum type of carbon, thickness of construction and size of

carbon block. Results of recent experiments on hearth linings. Graphs. (D1)

**316-D. The Effect of Sodium Oxide Additions to Steelmaking Slags. Part II. Dephosphorization of Steel by Soda-Slags.** W. R. Maddocks and E. T. Turkdogan. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 128-136.

Further experimental melts were made at 1400 and 1550° C., and results are considered in relation to earlier data. The soda-silica and Fe-silica ratios are the main factors determining the extent of the removal of P from Fe. Slag-composition limits and relationship between slag composition and density. Tables, graphs, and diagram.
(D general, B21, ST)

**317-D. Addition of Boron to Steel by Reduction From Boron Oxide.** G. E. Speight. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 147-153.

The method was investigated as an alternative to commercial addition alloys in a series of laboratory experiments. It is shown that B can be introduced into steel from a borate so as to give improved mechanical properties. The means adopted and underlying chemical theory. Practical recommendations in various steelmaking practices. Boron pick-up in electric arc furnace practice; influence of Al additions on boron transfer and its metallurgical effectiveness; and hardenability tests of Howlite-treated arc furnace casts. Tables and graphs.
(D general, B22, J26, AY)

**318-D. Sub-Surface Ingot Structure of Semi-Killed Steel.** R. Wogin and A. Goodall. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 154-159.

A study to find the average subsurface ingot structure produced by given amounts of ladle deoxidizer (silicomanganese) over the whole range of semikilled steels. Further experiments were made to find the quantitative effect of other variables on subsurface ingot structures, and a study was made of the defects associated with different types of semikilled ingot at one particular carbon level. Includes an extensive pictorial series in which structural variation at various carbon levels is traced and demonstrated. Graphs. (D9, M27, CN)

**319-D. Action of Inhibitors of Carbon Deposition in Iron Ore Reduction.** S. Klemantaski. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 176-182.

At 450° C., reduction and carbon deposition during the reaction of Co with Cumberland hematite ore can be controlled by the rate of gas flow and addition of small concentrations of carbon-deposition inhibitors ($C_2N_2$, $NH_3$, $H_2S$, $CS_2$). On the basis of these and other experiments, carbon deposition and its inhibition are considered. A method of determining the extent of carbon deposition in operating blast furnaces is suggested. Table, graphs, apparatus diagram. 12 ref. (D1, Fe)

**320-D. Oxygen Refining of Pig Iron.** *Metal Progress,* v. 62, July 1952, p. 156, 159-160. (Translated and condensed from "Refining of Phosphorus Cast Iron by Oxygen in the Openhearth Furnace", G. Husson and P. Bettembourg.)

Previously abstracted from *Revue de Métallurgie.* See item 161-D, 1951.
(D2, CI)

**321-D. Applying Research to Steel Works Plant and Operation.** R. F. Jennings. *Engineer,* v. 194, July 18, 1952, p. 83-84.

A general discussion.
(D general, A9, ST)

**322-D. Cooling of Rimming Steel Ingots in a Casting Pit.** R. T. Fowler and L. H. W. Savage. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 277-288.

Observations on the temperature distribution at midheight of an 8-ton slabbing ingot mold between teeming and stripping, using an improved technique to eliminate possible errors and obtain fuller data. Estimates were made of the rate of solidification of the midheight slice of steel and of the temperatures at its surface and center. (D9, ST)

**323-D. Investigates Methods for Capturing Dust in Gases.** S. Vajda and G. M. Dreher. *Steel,* v. 131, Aug. 4, 1952, p. 105, 108, 110, 113-114, 116, 119-120.

See abstract of "Open Hearth Dust Control", by Stephen Vajda, *Iron and Steel Engineer,* item 314-D, 1952. (D2, A5)

**324-D.** (French.) **Research on the Deoxidation of Killed Open-Hearth Steel. Part Two.** M. Nepper and H. Herbiet. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 274-280.

Results of investigations with eight types of steel indicate that, by the openhearth process, steel can be produced with only 0.005% $O_2$, and of excellent macrostructure. Details of the process. (D2, ST)

**325-D.** (German.) **Continuous Casting of Steel by the Junghans Process.** Karl Georg Speith and Adolf Bungeroth. *Stahl und Eisen,* v. 72, July 17, 1952, p. 869-881; disc., p. 881-885.

Basic advantages of continuous casting process. Effects of various factors on the process, as applied to round and square bars. Macrographs show structures obtained. Graphs. (D9, ST)

**326-D. Measurement and Control in the Utilization of Mixed Fuels and Oxygen in Open-Hearth Furnaces.** Martin J. Conway and Edward H. Cauger. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 4-10.

Measurement and control equipment at Steubenville works of Wheeling Steel Corp. Instrumentation and combustion techniques have made it possible for openhearths designed for 60-ton heats to produce heats of 170 tons with reduced fuel consumption per ton and increased checker life. Fuel temperature viscosity, and flow are controlled, as are furnace pressure, oxygen flow, and air flow. Photographs, diagrams, and table. (D2, S18, ST)

**327-D. Some Aspects of the Blast Furnace Situation in the United States.** Owen R. Rice. *Blast Furnace and Steel Plant,* v. 40, May 1952, p. 513-522; June 1952, p. 657-662; July 1952, p. 787-792; Aug. 1952, p. 926-927.

See abstract, *Journal of the Iron and Steel Institute,* item 140-D, 1952.
(D1, A4, Fe)

**328-D. Charge Control for a Basic Open Hearth Furnace.** V. H. Bridgewood, J. H. Kelly. *Blast Furnace and Steel Plant,* v. 40, August, 1952, p. 903-912.

The dual influence of $O_2$ equivalent of the metallic charge and ore charged was investigated. It was found possible to represent $O_2$ equivalent of the charge by $O_2$ equivalent of the Si in the iron. Ratio of the $O_2$ equivalent of ore to $O_2$ equivalent of Si in both hot and cold iron was found to have a significant influence on production rate and carbon at lime-up. A frequency distribution of the ore ratios in use was examined and an experimental ore ratio suggested. Influence of the limestone on basicity of slag at lime-up was also investigated. A nomogram and a slide rule for simple and fast determination of weights of both ore and limestone were developed. Advantages of the suggested charge control, and a spectrographic method of rapid determination of basicity is described.
(D2, ST)

**329-D. Melt Carbon and Related Open Hearth Problems.** W. J. Frisbie, Jr. *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 928-932, 946.

Openhearth operators have long maintained that carbon content of the bath at melt has a direct bearing upon the time in which a heat is made and possibly upon the quality of the product; therefore, it was decided to attempt to devise a method by which "melt" carbon could be controlled within practical operating limits. Details of calculations plus tabular and graphical data. (To be continued.) (D2, ST)

**330-D. Steel "Quality"—What It Is and How to Get It.** Harry W. McQuaid. *Metal Progress,* v. 62, Aug. 1952, p. 104-108, 164.

Various factors include avoidance of film-type sulfides, use of material low in S, addition of V for grain-size control, induction stirring, injection of finely dispersed basic compounds such as $CaC_2$, and use of directly reduced Fe as charge material. Pros and cons of each of these suggestions. Advantages of electric-furnace melting.
(D5, D general, ST)

**331-D. Economics of the Small Independent Steel Plant.** *Metal Progress,* v. 62, Aug. 1952, p. 120, 122, 124. (Condensed from "Comparative Economics of the Electric Furnace and Openhearth", H. W. McQuaid, *Iron and Steel Engineer.)*

Previously abstracted from original. See item 63-D, 1952.
(D2, D5, ST)

**332-D. Philippine Plant Makes First Steel.** *Steel,* v. 131, Aug. 18, 1952, p. 108, 111.

Equipment and procedures of Marcelo Steel Corp., Manila. War-surplus scrap serves as raw material for electric-furnace shop. Merchant mill specializes on reinforcing bars.
(D5, F23, A5, ST)

**333-D.** (Book—Russian.) **Proizodstvo Malouglerodistoi Stali.** (Production of Low-Carbon Steel). D. P. Strugovshchikov. 216 pages. 1950. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Sverdlovsk and Moscow, U.S.S.R.

Technology of the production of killed and unkilled low-carbon steels. Properties of steel, its flaws, and measures taken to eliminate them during melting and casting, along with theoretical bases of the technology of melting and casting of steel. (D general, CN, CI)

# E

## FOUNDRY

**472-E. Design-Production Teamwork Key to Foundry Engineering Advances.** *Canadian Metals,* v. 15, July 1952, p. 26-27.

Several case-records on steel castings as evidence of value of the recommended teamwork. Photographs. (E general, CI)

**473-E. New Melting Process Reclaims Borings.** *Canadian Metals,* v. 15, July 1952, p. 30-32.

Process developed by Crofts (Engineers) Ltd., England, involving forcible injection of untreated cast-

iron borings into the melting zone of the foundry cupola. (E10, CI)

**474-E. Basic Refractories for Cupola Service.** M. W. Demler. *Canadian Metals,* v. 15, July 1952, p. 33-34.

See abstract, *American Foundrymen's Society,* Preprint 52-20, 1952; item 413-E, 1952. (E10)

**475-E. Cast Iron Research Laboratories.** *Chemical Age,* v. 67, July 12, 1952, p. 53-55.

Brief listing of research investigations now being conducted at Bordesley Hall, Birmingham, England. Nodular-graphite formation in the as-cast condition with special reference to interfering elements; effect of gases on properties of cast iron; direct reading methods for cast-iron analysis and determination of trace elements in cast iron; causes of enameling defects; properties of sand at high temperatures, and many others.
(E general, A9, CI)

**476-E. New Data on Ductile Cast Iron.** Alexander I. Krynitsky and Harry Stern. *Industrial Heating,* v. 19, July 1952, p. 1219-1220, 1356.

See abstract of "Experimental Production of Nodular Graphite in Cast Iron." *Foundry;* item 256-E, 1952. (E25, M27, CI)

**477-E. Pressure Die-Casting of Aluminimum. Part I. Design. Part II. Selection of Alloy. Part III. Holding Furnaces. Part IV. Die Casting Machines. Part V. Design of the Die.** H. J. Sharp. *Metal Industry,* v. 81, July 4, 1952, p. 6-9; July 11, 1952, p. 27-28; July 25, 1952, p. 63-67; Aug. 1, 1952, p. 83-86.

Photographs, graphs, diagrams and tables. (To be continued.)
(E13, Al)

**478-E. Foundrymen Discuss Shell Molding and Ductile Iron.** *Metal Progress,* v. 62, July 1952, p. 93-95, 146-147.

Reports on the Naval Foundry Conference at Norfolk Naval Shipyard and the International Congress of the American Foundrymen's Society, Atlantic City. Brief data on mechanical properties of ductile iron. (E16, Q general, CI)

**479-E. Mold Blowing Reaction.** *Metal Progress,* v. 62, July 1952, p. 176. (Condensed from "A Contribution on the Metallic Mould Blowing Reaction", V. Kondic, G. Martin, and K. Bromage.)

Previously abstracted from *Metallurgia.* See item 282-E, 1952.
(E25, Fe, ST, Sn, Cu)

**480-E. Hydraulics Applied to Molten Aluminum.** D. S. Richins and W. O. Wetmore. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 725-732.

Some of the more common fluid-dynamic properties of a molten Al alloy when flowing in sand ducts were evaluated in the initial phase of an investigation to determine the effects of various configurations of casting flow systems upon casting quality. Graphs, photographs, tables. 10 ref. (E25, Al)

**481-E.** (French.) **Mechanized Casting of Hotchkiss-Gregoire Automobile Body Cowling.** Charles Roinet. *Revue de l'Aluminium,* v. 29, May 1952, p. 187-195.

Equipment and procedures. Material is an Al alloy. (E general, Al)

**482-E.** (German.) **Filling of the Dies in Pressure Casting.** G. Lieby. *Giesserei,* v. 39, June 2, 1952, p. 311-315.

Mode of filling of dies is discussed on the basis of hydrodynamic laws. Recommendations for choice of dies, position of casting, etc. Schematic diagrams. (E13)

**483-E.** (Swedish.) **Monolithic Cupola Linings.** Folke Sandford and Stig Fransson. *Gjuteriet,* v. 42, June 1952, p. 91-95.

Laboratory tests showed that the strain in the cupola shell when using a rammed silica-base cupola lining is not so large that there is any risk that a normally dimensioned cupola shell should break due to thermal expansion on heating or its growth on transformation of the silica to cristobalite. Tables and graphs.
(E10)

**484-E.** (Swedish.) **The Effect of Mold Material on Gas Content of Red Bronze Castings.** T. Malmberg. *Gjuteriet,* v. 42, June 1952, p. 96-103.

By density determinations on different parts of DfD test bars, cast of red bronze, it was established that moisture content of the molding sand may cause porosity. Different mold materials were investigated; clay-bonded sands both green and dry, sands bonded with special chemicals, and molds lined with sheet metal. A statistical survey was made of density of the feeder heads as well as the test bars as a function of pouring conditions. 10 ref.
(E18, Cu)

**485-E. Synthetic Resins for Foundry Use.** *Engineer,* v. 194, July 1952, p. 85-86.

Materials and techniques under investigation and development at Imperial Chemical Industries Ltd., Plastics Division, Welwyn, England.
(E18)

**486-E. Selection, Testing and Use of Bonding Clays in Synthetic Molding Sand.** W. W. Kerlin, *Foundry,* v. 80, Aug. 1952, p. 86-91, 223-224, 226.

Treatment of chemical analyses, fusion points, plasticity, clay material in foundry sand, and physical properties of various clays. Graphs, diagrams, photographs, and tables.
(E18)

**487-E. Gating for Shell Molding.** Walter A. Sokolosky. *Foundry,* v. 80, Aug. 1952, p. 92-93.

Fundamentals of gating of castings to be made in shell molds. Shell molds are compared with green-sand molds and the difference noted. Diagrams. (E22, E19)

**488-E. Refractory Permanent Molds.** J. B. McIntyre. *Foundry,* v. 80, Aug. 1952, p. 102-103, 228, 232.

Development of molds from prehistoric times to the present. Primarily concerned with present-day refractory mold materials and problems. (E12, E19, SG-h)

**489-E. Simple Correlation in the Foundry.** W. K. Bock. *Foundry,* v. 80, Aug. 1952, p. 104-109.

Fundamentals of correlation, its limitations and precautions to take in its application. Correlation permits use of simple tests to get information not otherwise available and provides some measurement to improve foundry operations.
(E general)

**490-E. Induction Furnace Melting of Corrosion-Resistant Alloys.** B. Spindler. *Foundry,* v. 80, Aug. 1952, p. 110-113.

Production melting equipment and foundry technique used in casting Ni-base alloys and high-alloy stainless steels. Production problems. Photographs. (E10, AY, SS, Ni)

**491-E. Process Control of Cast Iron for Vitreous Enamelling.** J. Bernstein. *Foundry Trade Journal,* v. 92, June 5, 1952, p. 603-606; v. 93, July 10, 1952, p. 49-54.

Experiences in the production of iron castings for wet-process vitreous enameling, the products being designed for domestic and industrial applications. Second installment includes cleaning and enameling operations. Photomicrographs.
(E11, L27, CI)

**492-E. Thermal Expansion and Contraction of Compacted Steel-Founding Sands and Mould Washes.** D. V. Atterton. *Foundry Trade Journal,* v. 93, July 17, 1952, p. 61-68.

Length changes that occur during the heating and cooling of small, dried compacts of various molding materials were investigated. A theory is proposed to explain the variations observed. Castings defects caused by volume instability in the mold material are discussed in the light of the results, which suggest that differential expansion between the facing sand and underlying sand is the primary cause of scabs. 11 ref. (E18)

**493-E. Manufacture of High-Quality Steel Castings at an Economic Price.** J. J. Dewez. *Foundry Trade Journal,* v. 93, July 10, 1952, p. 33-37; July 17, 1952, p. 77-80.

Design; drafting-room cooperation; quality control; sampling; melting; heat treatment; and inspection. Schematic drawings.
(E general, J general, S13, CI)

**494-E. Nitrogen Degassing & Metal Mould Reaction in the Production of Gunmetal Castings.** E. C. Mantle. *Foundry Trade Journal,* v. 93, July 24, 1952, p. 95-98; disc., p. 99-100.

Laboratory and foundry experimental work. Nitrogen-degassing technique. (E25, Cu)

**495-E. Metals Melted Without Crucibles.** E. K. Okress and D. N. Wroughton. *Iron Age,* v. 170, July 31, 1952, p. 83-86.

Westinghouse's induction levitation method. Metals are heated, melted, and stirred with no support other than magnetic fields. Process shows promise for production of pure high-temperature metals, for alloying, and for sintering. Al, Al bronze, Ti, and Ag have been treated with varying success in air and in vacuum. Diagrams and photographs. (E10, Al, Ti, Ag, EG-d)

**496-E. U. F. and P. F.; the Use of Synthetic Resins in the Foundry.** *Metal Industry,* v. 81, July 25, 1952, p. 70-71.

Urea and phenolformaldehyde resins for core binders. The shell-molding process. (E18, E16)

**497-E. Investment Casting Method for Superalloy Parts Lowers Cost—Improves Design—Saves Material.** Clarence E. Levoe. *Western Metals,* v. 10, July 1952, p. 44-47.

System of investment casting used successfully on superalloy aircraft and guided-missile parts. (E15, SG-h)

**498-E. Technique for Vacuum Impregnation of Non-Ferrous Castings Is Used at Northrop.** Frank Charity. *Western Metals,,* v. 10, July 1952, p. 48-49.

Impregnation of Al and Cu alloys with sodium silicate, vinyl lacquers, styrene, and phenolformaldehyde resins. (E25, Al, Cu)

**499-E.** (French.) **Experimental Study on the Efficiency of Recirculation in Foundry Furnaces.** (Concluded.) **Part III. Results.** Georges Ulmer. *Fonderie,* June 1952, p. 2971-2982.

Tests with full-furnace charge. Heat input, output, and losses are indicated and related to the problem of recirculation. Tables and graphs. (E10)

**500-E.** (French.) **Study on Concretion, and Its Remedies.** Pierre Nicolas. *Fonderie,* June 1952, p. 2983-2984.

Foundry defect, also known as "galling", is characterized by penetration of the metal underneath "tongues" of sand partially detached from the mold. Causes and remedies. (E19)

**501-E.** (French.) **Exhausting of Fumes From Crucible Furnaces.** *Fonderie,* June 1952, p. 2985-2990.

Structural details for eliminating fumes from furnaces melting Cu and light alloys. Diagrams and illustrations. (E10, Cu, Al, Mg)

**502-E.** (French.) **Some New Methods in Steel Foundry Practice.** P. Blanchard. *Métallurgie et la Construction Mé-*

*canique,* v. 84, June 1952, p. 413-415, 417-418.

Improvements in feedheads, and the advantages of centrifugal casting. (E14, E23, CI)

**503-E.** (French.) **Die Casting in the Construction of a Household Appliance.** R. Grunberg. *Métallurgie et la Construction Mécanique,* v. 84, June 1952, p. 421, 423, 425.

Zn die casting technique, using structural parts of the Hoover vacuum cleaner as an example.
(E13, Zn)

**504-E. Better Control of Malleable Iron: New Tuyeres Improve Blast Penetration.** Lewis Koch. *American Foundryman,* v. 22, Aug. 1952, p. 36-38.

How a tuyere of novel design has helped improve duplex melting operations in a malleable foundry. Diagrams, graphs, and illustrations.
(E10, CI)

**505-E. Current Status of Shell Molding.** Richard Herold. *American Foundryman,* v. 22, Aug. 1952, p. 42-46.

See abstract of "Sand Casting With Croning Process Shell Molds", *Canadian Metals,* item 316-E, 1952.
(E16, Al, CI, AY)

**506-E. For Accurate Green Sand Test Results Standardize, Maintain Testing Equipment.** *American Foundryman,* v. 22, Aug. 1952, p. 53-55.

Standardization and maintenance of sand-testing equipment. Availability of standard checking devices for measuring performance of testing equipment. (E18)

**507-E. How to Produce High-Quality Aluminum Die-Castings.** Henry H. Ryffel. *Machinery* (American), v. 58, June 1952, p. 170-175; Aug. 1952, p. 152-155.

Equipment and procedures of Hoover Co., North Canton, Ohio. Tabular data and illustrations.
(E13, Al)

**508-E. Shell Mold Casting of Stainless Steel.** *Machinery* (American), v. 58, Aug. 1952, p. 184-187.

Equipment and procedures of Cooper Alloy Foundry Co., Hillside, N. J. (E16, SS)

**509-E. Mechanized Foundry Layout.** *Mechanical Handling,* v. 39, Aug. 1952, p. 378-382.

Triplex Foundry, Ltd., Great Bridge, Staffs, England, producer of repetition casting for grates. Photographs and detailed diagrams.
(E general, CI)

**510-E. Rotary Melting Furnaces.** *Metal Industry,* v. 81, Aug. 1, 1952, p. 90-91.

Furnaces made by a British firm. Fuel consumption and melting times of a 2-ton furnace applied to steel, high-duty iron, malleable iron, copper, gunmetal, and aluminum.
(E10, ST, CI, Cu, Al)

**511-E. Solidification of Gray Iron.** *Metal Progress,* v. 62, Aug. 1952, p. 124, 126, 128. (Condensed from "Solidification of Gray Iron in Sand Molds", R. P. Dunphy and W. S. Pellini, *Naval Research Laboratory,* Report 3792, Jan. 17, 1951.)

Previously abstracted from *American Foundrymen's Society,* Preprint 22, 1951. See item 283-E, 1951.
(E25, N12, CI)

**512-E. Impregnation of Castings.** *Metal Progress,* v. 62, Aug. 1952, p. 154, 156. (Condensed from "Vacuum Impregnation of Castings", L. W. Hull, *Journal of Metals.)*

Previously abstracted from original. See item 134-E, 1952. (E25)

**513-E. Costs Cut 30% by Investment Castings.** *Precision Metal Molding,* v. 10, Aug. 1952, p. 30-31.

Type 303 stainless and SAE 1020 investment-cast gunsights made by Hitchiner Mfg. Co., West Hartford, Conn. Advantages over machined parts. (E15, T2, SS, CN)

**514-E. Beryllium Copper Cavities for Die Castings.** *Precision Metal Molding,* v. 10, Aug. 1952, p. 32-34.

Cavities previously used only for plastic molding are now used successfully for high-quality Zn die castings. Physical properties of beryllium copper, service characteristics of the cavities, methods of forming them, normal tolerances that can be held, and limitations on shape. They are produced by pouring around a master steel hob and immediately applying pressure.
(E13, T5, Cu, Zn)

**515-E. Pressure-Tight Bronze Investment Castings.** *Precision Metal Molding,* v. 10, Aug. 1952, p. 35.

For pump housing cast in Si bronze. When nonporosity is coupled with complex coring, use of investment casting allows substantial savings to be made. (E15, T7, Cu)

**516-E. Techniques for Melting Aluminum.** J. L. Stroman. *Precision Metal Molding,* v. 10, Aug. 1952, p. 41-42, 80-81.

Two-chamber melting furnace overcomes problems caused by adding cold metal to molten bath.
(E10, Al)

**517-E.** (Book) **Die-Casting.** Ed. 2. Charles O. Herb. 310 pages. 1952. Industrial Press, 140-148 Lafayette St., New York 13, N. Y. $4.50.

The chapters relating to die-casting machines, die-casting alloys, and steels for dies and die components have been extensively revised. New examples of unusual die castings have been added—including a detailed description of an induction-motor rotor die-cast as a single unit around stacked laminations. The latest models in automatic and manually operated die-casting machines are illustrated. Six new tables of die-casting alloy compositions and properties have been added.
(E13)

**518-E.** (Book) **Metallurgy for Engineers: Casting, Welding, and Working.** John Wulff, Howard F. Taylor, and Amos J. Shaler. 624 pages. 1952. John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. $6.75.

The first half of the book explains the concepts and principles that underlie metal processing from ingots to finished articles of commerce. The second half deals with the processes themselves. Written from the engineering rather than the shop viewpoint.
(E general, F general, G general, K general)

**519-E.** (Book—Russian.) **Sviaziushchie Materialy dlia Sterzhnei.** (Binding Materials for Cores) I. B. Kumanin and A. M. Liass. 272 pages, 1949. Government Publishing House for the Defense Industries, Moscow, U.S.S.R.

Theoretical bases of the action of core binders and practical information on their application in foundries and casting departments. Properties and special features of individual binders used in the U.S.S.R. Methods of testing binders. (E18)

# F

## PRIMARY MECHANICAL WORKING

**227-F. How Draw Speed Affects Stainless Wire.** Samuel Storchheim. *American Machinist,* v. 96, July 21, 1952, p. 124-125.

Effects of draw speed on coercive force, remanence, ultimate tensile strength, and electrical resistivity of Types 302 and 304 stainless steel wires. Tables and graphs.
(F28, P15, P16, Q27, SS)

**228-F. High Alloy Metals Hot Extruded.** *Canadian Metals,* v. 15, July 1952, p. 20-21.

See abstract of "Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical," *Steel;* item 171-F, 1952. (F24, SS, Mo, Ti)

**229-F. Developments in D-C Drives for Hot Strip Mill Runout Tables and Coilers.** H. E. Larson. *Iron and Steel Engineer,* v. 29, July 1952, p. 55-76; disc., 76-77.

The 14 years of experience of General Electric Steel Mill Division. Tabulated data; circuit diagrams, photographs, and graphs. (F23, ST)

**230-F. Discussion on the Paper—Cooling Beds for Bar Mills.** *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 183-189.

A discussion, with author participation, of the above paper (Nov. 1951 issue; item 18-F, 1952). Graph.
(F23, ST)

**231-F. Width Gage for Hot Strip Rolling Mills.** E. S. Sampson. *Proceedings of the National Electronics Conference,* v. 7, 1951, p. 341-351.

Described, diagrammed, and illustrated. (F23, S14)

**232-F. Soaking Pit Covers Poured With Castable Refractory.** W. B. Smith. *Steel,* v. 131, July 21, 1952, p. 100, 103.

Pouring procedure. Poured pit covers have a life from 7 months to 2 years. (F21)

**233-F.** (French.) **New Rolling Mills for Production of Thin Sheets of Aluminum.** M. Coquand. *Revue de l'Aluminium,* v. 29, June 1952, p. 235-238.

Equipment of a French firm.
(F23, Al)

**234-F.** (French.) **Ferblatil—a Modern Plant for Cold Rolling and Electroplating.** Michel Gevers. *Revue Universelle des Mines, de la Métallurgie des Travaux Publics, des Sciences et des Arts appliqués, a l'Industrie,* ser. 9, v. 8, June 1952, p. 212-228.

The plant, and its manufacturing processes, such as sheet steel cold rolling, pickling, machining, and electroplating. Micrographs.
(F23, G17, L12, L17, ST)

**235-F.** (German.) **Productivity Increase in the Drawing of Bars Using Infinitely Variable Speed Control.** Fritz Boehm. *Stahl und Eisen,* v. 72, July 3, 1952, p. 797-804.

Results of a comprehensive experimental and theoretical investigation. Graphs. (F27, ST)

**236-F.** (German.) **Economic Lot Sizes for Work on Special Machines for Wire Processing.** Joseph Billigmann. *Stahl und Eisen,* v. 72, July 3, 1952, p. 833-837; disc., p. 837-838.

Effect of lot size on costs of fabrication and minimum number of pieces when using special machines. Charts for use in such calculations, also specific applications. (F28)

**237-F.** (German.) **The Effect of Additions on the Extrudability of Cable Lead.** Arnold Loeschmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, June 1952, p. 219-223.

Comparative experiments show that solid-solution-forming elements (such as Sb and Sn) impede the recrystallization of cable lead less than highly dispersed insoluble additions (such as Cu, Te, Al, and Ca), and that solid-solution-forming elements increase the required extrusion pressure, while soluble alloy additions have little effect on it. Diagrams, graphs, tables, and photographs. (F24, Q24, Pb)

**238-F. Pierce, Draw Hollow Steel Forgings to 13 Tons.** *American Machinist,* v. 96, Aug. 4, 1952, p. 146-147.

Heavy-wall steel forgings are be-

ing produced by a pierce-and-draw method using a graphite lubricant. Developed by Babcock & Wilcox primarily to produce headers for high-pressure steam-generating equipment, the method is expected to provide an economical means of producing accumulators, pressure vessels, heat exchangers, large bearing races, and other hollow forgings. (F22, F26, G1, ST)

**239-F. Tube Manufacture; the Bronx Continuous Forming and Welding Machine.** *Automobile Engineer,* v. 42, July 1952, p. 271-272.
(F26)

**240-F. Wax Comes to the Metal Shop.** *Business Week,* Aug. 2, 1952, p. 85-86.
Use as metalworking lubricant.
(F1, G21)

**241-F. Cold Rolling With Strip Tension. Part II. Comparison of Calculated and Experimental Results.** F. Ellis, D. R. Bland, and H. Ford. **Part III. An Approximate Treatment of Elastic Compression of the Strip in Cold Rolling.** *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 239-249.
Part II: The approximate method of calculating roll force and roll torque is compared with the experimental results of Hessenberg and Sims. Part III: Approximate equations are derived for the contributions to the roll force and torque from those parts of the roll gap in which the strip is only elastically compressed. Tables and graphs. 12 ref. (F23)

**242-F. The Manufacture of Reinforced Steel Tubing.** E. Hörmann. *Engineers Digest,* v. 13, July 1952, p. 225-226. (Translated and condensed from *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, Apr. 21, 1952, p. 343-345.
Steel tubes may be reinforced or flanged by upsetting under heat. Local induction heating is recommended. Manufacture of internal reinforcements. Tensile strength of 24-ton steel at elevated temperatures. (F26, ST)

**243-F. Steel Tube Production by Electric Resistance Welding.** *Engineer,* v. 194, July 18, 1952, p. 94-95.
Abstracted under similar title from *Railway Gazette,* item 244-F, 1952. (F26, ST)

**244-F. Tube Manufacture by Electric Resistance Welding.** *Railway Gazette,* v. 97, July 18, 1952, p. 70-73.
Equipment and procedures of British firm. (F26, ST)

**245-F. Thicker Boiler Plate Formed Faster.** *Steel,* v. 131, Aug. 11, 1952, p. 84-87.
New vertical press and horizontal draw bench at Babcock & Wilcox Co.'s Barberton, Ohio, plant which produce rough hollow forgings up to 35 in. o.d. with 4½-in. walls.
(F22, F26, G1, CN)

**246-F.** (German.) **New Methods for Manufacture and Use of Aluminum-Sheathed Cables.** K. H. Hahne. *Aluminium,* v. 28, July-Aug. 1952, p. 230-237.
Apparatus and procedures for production of the above. Diagrams and illustrations. (F28, T7, Al)

**247-F.** (German.) **New Results of Rolling Research and Their Application to Rolling Practice in Hot and Cold Rolling of Metals, Particularly Aluminum-Base Light Alloys.** O. Emicke. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, June 1952, p. 189-206.
Large-scale experiments on the cold rolling of copper, brass, aluminum, and duralumin, and on deep drawing strip steel, for the purpose of finding reliable and simple bases for calculation of rolling processes. Data are extensively charted. 13 ref. (F23, Cu, Al, ST)

**248-F.** (German.) **Practical Problems of Steel for Sheet and Strip.** Erich Schauff. *Stahl und Eisen,* v. 72, July 17, 1952, p. 892-898.
Qualities of thickness uniformity, surface finish, and deformability of sheets required by the metalworking industries; effects of composition; statistical analyses of essential elements, oxides, and other nonmetallic inclusions in the steel; and killed vs. rimming steel. Tables, graphs, and photomacrographs.
(F23, ST)

**249-F. Forged Skin-Panels: Development of Technique for the Production of Integrally-Stiffened Aircraft Units. Part I. Design Considerations; Forging Principles; Die-Design. Part II.** *Aircraft Production,* v. 14, June 1952, p. 191-197; Aug. 1952, p. 261-268.
Work in the U. S. by Lockheed Aircraft Corp., U. S. Air Force, and Wyman-Gordon Co. Al alloy is used.
(F22, Al)

**250-F. Wide Strip Mills—Evolution or Revolution?** Frank H. Fanning. *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 913-920.
Reviews history. Effects on productive capacity and other economic gains. Illustrations show results of cupping tests and microstructure of annealed sheets produced in different ways, also automobile-body parts made from them. (To be continued.)
(F23, CN)

**251-F. South Africa Now Has Modern Steel Plant.** *Blast Furnace and Steel Plant,* v. 40, Aug. 1952, p. 933-934.
Plant of South African Iron & Steel Industrial Corp. Emphasizes rolling mills. (F23, ST)

**252-F. Novel Press Setups Produce Cold-Drawn, Hot-Forged Parts.** A. B. Mooers. *Iron Age,* v. 170, Aug. 14, 1952, p. 130-133.
Unusual setup used by Buick Motors Div. to turn out a rear-axle housing flange. SAE 1008-1020 hot drawn plate blanks are tumble blasted before drawing. All cold operations except blanking are done in four dies mounted in one Toledo 96-B press. A Surface Combustion rotary furnace heats the partly formed parts in a scale-inhibiting atmosphere. Hot working is completed in a 1300-ton Ajax forging press. A six-man team turns out 365 parts per hr. (F22, G1, CN)

**253-F. Controls Ease Precision Tube Problems.** Paul V. Fly. *Steel,* v. 131, Aug. 18, 1952, p. 94-95.
Production of stainless tubing in sizes from 0.010 to 0.625-in. o.d. calls for close control of all operations—cold drawing, de-rodding, and annealing. Procedures and equipment of Tube Methods, Inc., Bridgeport, Pa. (F26, J23, SS)

**254-F. The Perfect Profile—a Yardstick.** Frances Mortimer. *Wire and Wire Products,* v. 27, Aug. 1952, p. 783-784, 827.
Method of measuring wiredrawing die bores using the instrument developed by BISRA. Faults in die construction. (F28, S14)

**255-F.** (Book) **Steel Wire in America.** Kenneth B. Lewis. 351 pages. Wire Association, Stamford, Conn. $15.00.
Raw materials, rods, pickling, acids, inhibitors, nails, galvanizing, and other phases. History, metallurgy of plastic flow, biographies of present-day personalities in the industry, die history, and stress theories. (F28)



# G

## SECONDARY MECHANICAL WORKING

**373-G. How to Bend High-Strength Extruded Shapes.** F. C. Hoffman. *American Machinist,* v. 96, July 21, 1952, p. 115-122.
New method developed at Lockheed Aircraft Corp. Jobs that formerly required 30 min. now can be done in 3. Accuracy within 5 min. of arc can be held consistently. Bending is performed in a specially designed fixture mounted in a standard hydraulic press. (G6)

**374-G. Crush Grinding Makes Accurate Broaches.** H. H. Gotberg. *Iron Age,* v. 170, July 17, 1952, p. 130-131.
How the latest crush-grinding techniques permit making quantities of small, intricate broaches with identical accuracy. (G18)

**375-G. Titanium Sheetmetal Parts Successfully Made.** Andrew N. Eshman. *Iron Age,* v. 170, July 17, 1952, p. 132-135.
Fabrication processes for Ti webs, channels, frames, shrouds, and angles at North American Aviation, Inc., Columbus, Ohio. Forming and drilling are emphasized.
(G general, Ti)

**376-G. Some Recent Concepts of Machinability.** *Lubrication,* v. 38, July 1952, p. 81-96.
Fundamental processes involved in chip formation, tool life, role of cutting fluids in machining of metals, microstructure and machinability, application to cast iron, steels, high-temperature corrosion resistant alloys, and titanium. Tables, graphs, diagrams, and micrographs. (G17)

**377-G. North American Forms and Quenches Wing Grids in Dies.** Joseph S. Corral. *Machinery* (American), v. 58, July 1952, p. 158-163.
"Form-die quenching", as practiced at North American Aviation, Inc., Los Angeles. The wing grids are Al and the die members are made of Kirksite. (G1, J26, Al, Zn)

**378-G. Unusual Manufacturing Methods Developed by Lockheed.** *Machinery* (American), v. 58, July 1952, p. 164-171.
"Peen-forming" (shot-peening to put the curves into integrally-stiffened Al wing panel members); fabrication of integrally stiffened panels from tubular extrusions; and plastic tooling in forming operations. (G general, Al)

**379-G. Convair Saves Money and Metal With Fiber-Glass Tooling.** Charles O. Herb. *Machinery* (American), v. 58, July 1952, p. 172-177.
Use and production of fiber-glass tools at Consolidated Vultee Aircraft Corp., San Diego. (G general)

**380-G. Metal Forming by the Spinning Process.** R. H. Warring. *Machinery Lloyd* (Overseas ed.), v. 24, July 5, 1952, p. 81, 83-85.
Technique and scope; suitability of 22 materials for both shallow and deep spinning. Diagrams. (G13)

**381-G. The Influence of Higher Rake Angles on Performance in Milling.** Joe H. Crawford and M. Eugene Merchant. *Machinery* (London.), v. 81, July 10, 1952, p. 47-55.
A range of rake angles and cutting speeds was selected, and studies were made on cutter life and surface finish as a function of these variables. Effect of these variables on such quantities as forces, shear angle, chip friction, work done in

cutting, and calculated temperature of the chip-tool interface. High speed steel cutters and hot rolled SAE 1020 stock were used. Photographs, graphs, and table. (G17, CN, TS)

**382-G. Electric Spark "Machining".** *Machinery* (London.), v. 81, July 10, 1952, p. 57-61.

Equipment manufactured by Sparcatron, Ltd., Gloucester, England, for piercing and "grinding" operations. Examples of use. Block and circuit diagrams and photographs. (G17, G18)

**383-G. Hot Machining Methods for Difficult-to-Machine Metals.** A. A. Caminada. *Materials & Methods,* v. 36, July 1952, p. 98-100.

Survey of latest techniques shows that hot machining can reduce tool wear, increase cutting speed, and improve surface finish. Tables list the advantages and disadvantages of hot vs. cold machining and a comparison of various heating methods. Graphs. 11 ref. (G17)

**384-G. Cold Forming Stainless Steel Parts.** Kenneth Rose. *Materials & Methods,* v. 36, July 1952, p. 101-116.

Various stainless steels, their formability properties, grades and applications for specific operations. Selection factors, cold forming properties and methods, tool and die materials, cleaning and finishing and annealing procedures. (G general, SS)

**385-G. Cold Working Copper-Base Alloys.** H. M. Miekk. *Metal Industry,* v. 81, July 4, 1952, p. 10-13.

Influence of the crystal structure of alpha brass on its cold working properties, stressing uniformity and average grain size. Recommends that additions of phosphorus to $\alpha$-brass be avoided in the manufacture of brass sheet for deep drawing. (G4, Q24, Cu)

**386-G. Electro-Spark Erosion.** *Metal Industry,* v. 81, July 11, 1952, p. 31-33.

See abstract of "Electric Spark Machining", *Machinery* (London), item 382-G, 1952. (G17, G18)

**387-G. Hot Bending Large Diameter Pipes on Site.** *Welding and Metal Fabrication,* v. 20, July 1952, p. 246-247.

A plant in Kent, England, consists essentially of a sand-filling tower, a heating furnace, a bending table, and a bending capstan. (G6)

**388-G. Heating With the Oxyacetylene Flame.** Earl H. Frail. *Welding Journal,* v. 31 July 1952, p. 596-599.

Bending, straightening, and forming operations. Diagrams and illustrations. (G general)

**389-G.** (German.) **Composition and Use of Cutting Oils.** C. Becher. *Chemische Technik,* v. 4, Apr. 1952, p. 156-158.

Factors to be observed in the proper use of water-oil emulsions for cooling and lubrication in different kinds of machining operations. (G21)

**390-G. How to Machine and Finish Stainless Steel.** *American Machinist,* v. 96, Aug. 4, 1952, p. 111-126.

Basic rules governing tooling, machine operation, and cutting fluids. Specific operating tips for major metal-cutting operation. Latest ideas on finishing methods, including grinding, buffing, and polishing. Numerous tables, graphs, schematic drawings, and photographs. (G17, G18, L10, SS)

**391-G. Machinability of Gray Iron by Constant Pressure Lathe Tests.** Edward A. Loria. *Foundry,* v. 80, Aug. 1952, p. 194, 196, 198, 200.

Quantitative data on the machinability of various gray cast irons measured on the constant pressure lathe developed by Battelle Memorial Institute. (G17, CI)

**392-G. New Press Pierces, Bends Boiler Parts.** *Iron Age,* v. 170, July 31, 1952, p. 96-97.

An 8500-ton hydraulic press at the Barberton, Ohio, plant of Babcock & Wilcox Co. can double as a piercing and as a bending press. It is teamed with a 1200-ton hydraulic draw bench. (G2, G6, ST)

**393-G. Big Automatic Machines Revolutionize Sheetmetal Operations.** E. N. Laurance. *Iron Age,* v. 170, Aug. 7, 1952, p. 114-115.

Equipment of Glenn L. Martin Co., Baltimore. Fuselage and wing panels are produced on a 300-ton rising-bed-type Sheridan stretch-forming press. An all-hydraulic Hufford stretch-wrap forming machine features pushbutton automatic controls. Irregular contours and leading edges of parts for the Martin P5M-1 Marlin flying boat are being made on a Farnham forming roll. (G9)

**394-G. Drilling Machines. Part 3.** *Machine and Tool Blue Book,* v. 48, Aug. 1952, p. 243-244, 246, 248, 250, 252, 254.

Drilling stainless steels, Meehanite, graphitic steels, nitriding steels, hard materials, and armor plate. (G17, SS, CI, CN, SG-m)

**395-G. Use of "Draw Clips" for Forming Sheet Metal Parts With Rubber Dies.** J. A. Whittingham. *Machinery* (London), v. 80, July 17, 1952, p. 103-108.

Equipment and procedures used at the Columbus, Ohio, plant of North American Aviation, in production of wing ribs, stiffening channels, cowl formers, nose skins, and other Al aircraft parts. (G8, Al)

**396-G. Friction Sawing at Solar Aircraft.** Gilbert C. Close. *Modern Machine Shop,* v. 25, Aug. 1952, p. 136-140.

Experiments with toothless band saw blades point way to fast, economical method of cutting ferrous metals. (G17, Fe)

**397-G. Unusual Tools and Machines for the Mass Production of Parts.** C. W. Hinman. *Modern Machine Shop,* v. 25, Aug. 1952, p. 146-148, 150.

Rubber-pad dies for deep drawing and a method of bulging bowl-shaped shells. (G8, G4)

**398-G. New Jaws Reduce Stretching Costs.** Robert B. Stanton. *Modern Machine Shop,* v. 25, Aug. 1952, p. 206, 208, 210.

Less sheet stock material is required in stretch forming operation when swiveling-type jaws are used. (G9)

**399-G. Hi-Jet System for Increasing Tool Life.** R. J. S. Pigott and A. T. Colwell. *SAE Quarterly Transactions,* v. 6, July 1952, p. 547-566.

Improvements resulting from applying cutting liquids in fine forced jets. Compares results with those obtained by the flooding system. Adaptations of various recording instruments and other improvements developed during running of the tests. Practical applications of the Hi-Jet system. (G21, ST)

**400-G. Springback: Problem in Metal Forming.** Frederico Strasser. *Steel,* v. 131, Aug. 4, 1952, p. 90-91.

Springback is the property of any piece of metal which is bent or formed, either by hand, or by mechanical means, not to maintain completely the shape given to it by the tool, but to recover somewhat its original shape, or position, after the bending stress is released. Factors involved and methods for minimizing springback. Diagrams. (G general)

**401-G. Etching Rolls by Airless Blasting.** *Steel Equipment & Maintenance News,* v. 5, July 1952, p. 3.

Dressing temper mill rolls by airless blasting has proved very profitable at Weirton Steel Co., Weirton, W. Va. The process is being used primarily for etching rolls 8 or 9 in. in diam. for use in the temper rolling of strip prior to tin plating. (G23, ST)

**402-G. Die Design for Metal Blanking.** R. C. Berliner. *Steel Processing,* v. 38, July 1952, p. 329-332.

Three types of blanking dies: temporary or quick process type, permanent dies of the progressive type, and permanent dies of the compound type. Graphs. (G2)

**403-G. Metal Cutting Temperatures and Tool Wear. Part II.** (Concluded.) A. O. Schmidt. *Tool Engineer,* v. 29, Aug. 1952, p. 51-54.

Cratering effect observed at high cutting speeds caused by higher tool temperatures. Effects noted in carbide milling of SAE 1020, 1035, 3140, 4150, 4335, and NE 8745 steel. 11 ref. (G17, C-n, CN, AY)

**404-G. Tool Forces and Tool-Chip Adhesion in the Machining of Nodular Cast Iron.** K. J. Trigger, L. B. Zylstra, and B. T. Chao. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1017-1025; disc., p. 1025-1027.

An investigation of the machining characteristics of nodular cast iron in both the as-cast and the annealed conditions. Tool forces, cutting temperatures, and tool-chip contact areas are compared for different grades of cemented-carbide tools. Tables, graphs, and photomicrographs. 16 ref. (G17, CI)

**405-G. A Comparison of Parameters for the Machining of Gray Cast Iron.** L. V. Colwell, H. J. Holmes, and F. B. Rote. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1029-1037; disc., p. 1037-1038.

Compares several types of data on parameters for predicting cutting speeds of gray iron. A series of 11 irons, representing ranges of alloys, ferrite, graphite, and mechanical properties was used in the study. Cutting forces, power, and energy were determined from drilling and milling tests, and cutting speed vs. tool life lines were determined for each of the irons. Correlations were attempted between cutting speed for a 20-min. tool life, and other available information. Tables, graphs, and photomicrographs. (G17, CI)

**406-G. Thermophysical Aspects of Metal Cutting.** B. T. Chao, K. J. Trigger, and L. B. Zylstra. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1039-1049; disc., p. 1049-1054.

Some basic issues in the theory of metal cutting are analyzed. Effect of cutting speed and feed on the mechanism of chip formation in high-speed machining operations. A differential equation of the temperature field in the chip as well as that in the workpiece was set up, and the nature of the solution studied. The thermal number and its significance in metal cutting is illustrated and its limitations discussed. Graphs. 15 ref. (G17)

**407-G. The Mechanics of Three-Dimensional Cutting Operations.** M. C. Shaw, N. H. Cook, and P. A. Smith. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952 p. 1055-1064.

Chip-flow direction and the velocity and force relations for an oblique cutting tool are compared with experimental results. Analytical consequences of the observations. Method of applying the oblique-tool results to 3-dimensional tools is illustrated by three examples involving a lathe tool, a face-milling cutter, and a drill point. Diagrams, tables, and graphs. (G17)

**408-G. The Rotary Cutting Tool.** M. C. Shaw, P. A. Smith, and N. H. Cook. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1065-1073; disc., p. 1073-1076.

An unusual lathe-type cutting tool takes the form of a disk that may be rotated about its central axis. Representative test data for both rotary and stationary tools. Schematic drawings, charts, and photographs. (G17)

**409-G. Measuring the Cooling Properties of Cutting Fluids.** G. M. Hain. *Transactions of the American Society of Mechanical Engineers,* v. 74, Aug. 1952, p. 1077-1079; disc., p. 1079-1082.

Simple technique for evaluating the heat transfer properties of fluids. Graphs. (G21)

**410-G. The Big Squeeze.** W. P. Brotherton. *Western Machinery and Steel World,* v. 43, July 1952, p. 80-82.

Presses used at Ryan Aeronautical Co., San Diego, for the production of high-temperature structures for jet engines. (G1, SS, ST, Al)

**411-G. Temporary Dies Effect Saving of 90% on Limited Production and Experimental Work.** Stanley Wochnik. *Western Metals,* v. 10, July 1952, p. 39-40.

How the above is possible using dies of cold rolled steel, brass, Al, stainless, Monel, and laminated material. (G1, T5, SS, ST, Ni, Cu, Al)

**412-G.** (French.) **Importance of the Preparation of the Surface: Peening.** Roger Marpon. *Métallurgie et la Construction Mécanique,* v. 84, June 1952, p. 463, 465.

The problems of preparing metallic surface before painting. Mechanical and chemical cleaning. Special attention is paid to peening; advantages over other mechanical methods. (G23, L10, L12)

**413-G.** (German.) **Stamping of Aluminum.** G. Oehler. *Aluminium,* v. 28, July-Aug. 1952, p. 238-245.

Equipment and procedures. Design of tools. Bending and deep drawing. Influence of drawing speed, jack pressure, and lubrication. Power requirements. (G3, G4, Al)

**414-G.** (Spanish.) **Oxygen Cutting of Cast Iron, Stainless Steel, and Other Cast Alloys.** I. Aversten and Chr. Scharfhausen. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug. 1951, 9 pages.

Difficulties encountered in oxygen cutting and the conditions under which it can be used for different materials. Compares changes in material subjected to ordinary oxygen cutting and to oxygen cutting with pulverized iron. Drawings and photographs. (G22, CI, SS)

**415-G.** (Spanish.) **Oxygen Cutting With Powder.** André Brizard. *Ciencia y Técnica de la Soldadura,* v. 1, Sept.-Oct. 1951, 8 pages.

Three oxygen-cutting processes using iron powder, chemical powder, and inert powder. Materials needed and possible applications. Schematic drawings and tables. (G22)

**416-G. Jet Engine Combustion Chambers Made to Close Tolerances.** *Automotive Industries,* v. 107, Aug. 1, 1952, p. 40-41.

Production at Ryan Aeronautical Co., San Diego, of tubular chambers, involving punch presses and seam and spot welding. Outer chambers made of stainless steel and inner of Inconel. (G2, K3, SS, Ni)

**417-G. Carbon Dioxide Coolant Lowers Tool Grinding Costs.** John Kwolek. *Iron Age,* v. 170, Aug. 14, 1952, p. 124-125.

Extensive tests at Cadillac's Tank Plant show many advantages from use of $CO_2$ as a coolant in grinding carbide tools. Grinding can be done faster. Wheel life is longer. Life of tools ground is longer. Grinding is cleaner. There are no disposal, sanitation, or fire hazard problems. Surface finish is better. Materials handling is simplified. Cost is relatively high. (G21, C-n)

**418-G. Central System Distributes $CO_2$ Coolant for Grinding.** P. S. Cerne and C. O. Parrat. *Iron Age,* v. 170, Aug. 14, 1952, p. 126-128.

Extensive tests have sold Thompson Products, Inc., on use of $CO_2$ as a coolant in grinding carbide tools, carbide and high speed steel broaches. Experiments on other machining uses are being made. Thompson has installed a central storage tank from which a high-pressure pump feeds $CO_2$ through pipelines to points of use. (G21, C-n)

**419-G. What You Should Know About Stretch Forming.** E. V. Sharpnack. *Iron Age,* v. 170, Aug. 14, 1952, p. 138-140.

Advantages and disadvantages for production of Al parts. Recommendations for procedures and for selection of alloys. (G9, Al)

**420-G. Spin-Draw Complex Metal Parts.** *Iron Age,* v. 170, Aug. 1952, p. 140.

Brief description applied to Al and alloys. Diagrams. (G13, Al)

**421-G. Electro-Machining of Carbides and Other Hard Compacts.** Arthur H. Allen. *Metal Progress,* v. 62, Aug. 1952, p. 87-89, 142.

Use of this process to reduce consumption of diamond bort. The electrolytic process, the electro-sparking process, the ultrasonic process, and combination processes. (G17)

**422-G. Machinability: Theory Pays Off.** R. K. Gould. *Steel,* v. 131, Aug. 18, 1952, p. 98-102.

Elementary review of theory. Basic principles and underlying laws governing the cutting and machining of metals are gradually being put to work to solve tough machining problems. (G17)

**423-G. Torture Chambers for Jet Engines.** *Welding Engineer,* v. 38, Aug. 1952, p. 38-39.

See abstract of "Jet Engine Combustion Chambers Made to Close Tolerances," *Automotive Industries;* item 416-G, 1952. (G2, K3, SS, Ni)

**424-G. How to Cut Steel Sections.** G. E. Kabacy. *Welding Journal,* v. 31, Aug. 1952, p. 705-707.

Oxyacetylene process. (G22, CN)

**425-G.** (Book) **Design and Use of Cutting Tools.** Leo J. St. Clair. 421 pages. 1952. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $7.00.

How to select and use efficiently high speed steel, cast-alloy, and carbide cutting tools designed specifically to help machinists and tool engineers lower operating costs, eliminate waste, and produce better quality work. More than 50 tested ideas for increasing tool life and for achieving higher cutting speeds and feeds. Suggestions for strengthening cutting edges so as to prevent trouble on tough machining jobs. Performance advantages and disadvantages of each kind of tool. (G17, T6, TS, C-n)

**426-G.** (Book) **Schleif Industrie Kalender.** (Handbook of the Grinding Industry.) Ed. 25. 528 pages. 1952. Vulcan Verlag Dr. W. Classen, Wiessenstrasse 55, Essen, Germany. 14 DM.

Natural and synthetic grinding polishing agents; equipment, methods, and procedures for grinding metals, wood, and stone; physical properties and standards of grinding and polishing agents; trade names; other pertinent information. (G18)

# H

## POWDER METALLURGY

**92-H. Practical Applications of Hot Pressing.** Jerome F. Kuzmick. *Materials & Methods,* v. 36, July 1952, p. 84-87.

Applications of hot molding to production of tungsten carbide dies and shaped pieces, heavy metal products, and high-temperature alloys from metal powders. (H14, SG-h, W, C-n)

**93-H. Extinction Effects in Powders.** R. J. Weiss. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 553-555.

Brief mathematical discussion of an attempt to explain intensity differences for cold worked and annealed metal-powder samples. (H11)

**94-H.** (German.) **Sintering of Silver Powder by Use of Silver Compounds.** R. Palme. *Metall,* v. 6, July 1952, p. 369-371.

Reports on investigations aiming at diminishing the swelling of Ag sintered bodies caused by gas inclusions. Effects of an addition of 15 and 40% Ni, 2% graphite, or 6% CdO on density of the sintered bodies are charted. (H15, Ag)

**95-H.** (French.) **Acceleration of Single-Phase Sintering. Discussion of the Mechanism of Action of Mineral Additions.** Serge Tacvorian. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 9, 1952, p. 2363-2365.

Applied to refractory powders of different types: W, Th, graphite, $Al_2O_3$, MgO, $ThO_2$, carbides, etc. Shows effects of a small quantity of liquid phase, generally in equilibrium with the solid phase at the temperature considered. (H15, W, Th, C-n)

**96-H.** (German.) **Proposed Methods for Testing Metal Powders.** Rolf Schwalbe. *Stahl und Eisen,* v. 72, July 17, 1952, p. 898-903; disc., p. 903-904.

Methods for sampling and for determination of chemical composition, shape and size of grains, grain-size distribution, and powder-metallurgy characteristics (pouring and compression). Compilation of test values for several iron powders. (H11, Fe)

**97-H. Powder Metallurgy as a Research Tool.** H. W. Greenwood. *Metallurgia,* v. 46, July 1952, p. 8-10.

Advantages of using powder-metallurgy methods in metallurgical research. (H general)

**98-H. Porous Stainless Steel; a New Filter Material.** *Metallurgia,* v. 46, July 1952, p. 38.

Production, properties, and applications of British product. (H general, T29, SS)

**99-H. Technology of Pre-Alloyed Stainless Steel Powders—Properties, Production, Uses. Part 2.** Arthur H. Grobe and George A. Roberts. *Precision Metal Molding,* v. 10, Aug. 1952, p. 36-33, 74-75.

Summarizes results of extensive mechanical testing of sintered bars made from five types of stainless steel powder. Relationships to compacting and coining pressures and to sintering and resintering temperatures. (H general, Q general, SS)

J

## HEAT TREATMENT

**208-J. Induction Hardened Gears Show Little Distortion.** L. G. Miller. *American Machinist,* v. 96, July 21, 1952, p. 141.

Procedures of Greenlee Bros. & Co. for induction hardening a variety of Cr-Mo steel gears. Method of minimizing distortion. (J2, AY)

**209-J. Annealing Large Caliber Steel Cartridge Cases.** *Industrial Heating,* v. 19, July 1952, p. 1194-1198, 1210.

Special annealing process in operation at Ekco Products Co., Massillon, Ohio, used in the manufacture of steel cartridge cases. Photographs and diagrams. (J23, ST)

**210-J. Heat Treatment of Titanium-Rich Titanium-Iron Alloys.** H. W. Worner. *Industrial Heating,* v. 19, July 1952, p. 1200, 1202, 1204, 1206, 1208, 1210.

See abstract from *Journal of the Institute of Metals;* item 55-J, 1952. (J26, J27, Ti)

**211-J. Prediction of End-Quench Hardness in Steels Simplified.** M. A. Orehoski and J. M. Hodge. *Iron Age,* v. 170, July 17, 1952, p. 125-129.

Improved method for estimating Jominy end-quench curve from the first 1/16 in. to the region of 50% martensite. The method is not too accurate for boron steels. Numerous graphs and tables. (J26, ST)

**212-J. Precipitation Hardening of Hot Working and High Speed Steels.** Kehsin Kuo. *Research,* v. 5, July 1952, p. 339-340.

A study of the carbide reactions which occur during tempering of molybdenum and tungsten steels. (J27, J29, TS)

**213-J.** (Dutch.) **Carburization and Decarburization of Steel in an Artificial Atmosphere.** C. H. Luiten. *Smit Mededelingen,* v. 7, Apr.-June 1952, p. 59-63.

Shows that above is governed by chemical reactions of gases around the steel, that rate control depends on the velocity of different gas reactions, and that "carbon pressure" is controlled by certain interdependent gas ratios. Includes graphs. (J2, J28, ST)

**214-J.** (German.) **Induction Heating Equipment.** W. Stuhlmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 653-654.

Equipment for shaping, hardening melting of hard solder, and for drying. (J2, K7, L26)

**215-J.** (Russian.) **The Thermal Effect of the Process of Natural Aging of Al-Cu Alloys (5% Cu) After Hardening and Recovery.** S. M. Skuratov and N. S. Podol'skaia. *Zhurnal Obshchei Khimii,* v. 22 (84), Jan. 1952, p. 31-38.

The thermal effects were studied in a specially prepared alloy. Specimens were hardened at 19.2 and 26.0° C. Data are tabulated. (J27, Al)

**216-J. Austempered Lawnmower Blades Are Hard, Tough.** W. G. Patton. *Iron Age,* v. 170, July 31, 1952, p. 88-90.

Manufacture of the blades, especially heat treating operations. Hardening temperature of SAE 1060 and 1070 blades is 1550-1600° F.; transformation temperature is 600° F.; salt-bath installation is completely conveyerized. (J26, CN)

**217-J. How to Set Up a Heat Treating Department.** W. G. Patton. *Iron Age,* v. 170, Aug. 7, 1952, p. 109-113.

Equipment and procedures of Teer, Wickwire & Co., Jackson, Mich. Some 150-175 tons of kingpins, aircraft-valve rocker arms, track link pins, hydraulic ram assemblies and other critical parts are treated. Included in basic equipment are two Homo-Carb furnaces, three salt baths, a tempering furnace, oil and caustic quench baths, and a cooling tower. Automatic controls, recording equipment, and special handling devices are built in. Results on carbon and alloy steels. (J general, CN, AY)

**218-J. The Rapid Softening of Cold-Drawn Austenitic Stainless Steels.** F. A. Hodierne and C. E. Homer. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 249-253.

A detailed study of the effects of softening treatment on properties and structure of five different stainless steels. Includes corrosion resistance, hardness and microstructure. Recommended conditions for rapid softening. (J29, M27, Q29, R general, SS)

**219-J. Value of Furnace Research Shown at Electric Furnace.** C. L. West. *Steel Processing,* v. 38, July 1952, p. 344-350.

The research department begun in 1931 at the Electric Furnace Co., Salem, Ohio, has proven very valuable in its constant study of materials for furnace construction, determining temperatures, cycles and furnace atmosphere required in the heat treatment of metal products. Studies have also indicated the most suitable design and size of furnace and gas-atmosphere equipment for specific production requirements. (J general)

**220-J. Heat-Treating and Machining of Boron Steels. Part I.** J. D. Graham. *Tool Engineer,* v. 29, July 1952, p. 46-48; Aug. 1952, p. 58-60.

Machining as related to heat treatment and isothermal transformation. Tables and graphs. (J26, G17, AY)

**221-J. How to Cool Oil-Quench Tanks.** C. L. Ringquist. *American Machinist,* v. 96, Aug. 18, 1952, p. 106-108.

Description and detailed diagrams of four typical cooling systems for controlling quench-oil temperature. (J2)

**222-J. Better Heat Treating Born in Research.** C. L. West. *Iron Age,* v. 170, Aug. 14, 1952, p. 134-136.

Previously abstracted from *Steel Processing,* item 219-J, 1952. (J general)

**223-J. Isothermal Heat Treatment of Meehanite Metal.** C. R. Austin. *Metal Progress,* v. 62, Aug. 1952, p. 109-112.

Establishment of S-curve of Meehanite. From the results, selected heat treatments were recommended for investigation on effects of interrupted quenching treatments in terms of both Brinell hardness and tensile strength of the heat treated irons. Jominy end-quench data obtained after austenitizing at 1560 and 1785° F. show effect of maximum temperature of heating on hardenability. Data are compared with those for high-Si spring steels. (J26, N8, CI, AY, SG-b)

**224-J. Hevi Duty Shaker Hearth Furnace.** *Metal Treating,* v. 3, July-Aug. 1952, p. 3-4.

Commercial equipment designed for production of exacting physical properties in small parts. (J general)

**225-J. A Successful Method of Heat Treating Water Hardening Forging Dies.** Horace C. Knerr. *Metal Treating.* v. 3, July-Aug. 1952, p. 18.

Equipment and procedure. Diagrams. (J26, TS)

**226-J. Flame Hardening Turret-Ring Ball Races.** B. A. Schevo and Z. J. Fabrykowski. *Welding Journal,* v. 31, Aug. 1952, p. 699-703.

Fixture and process for successfully flame hardening FS4140 steel ball races of vehicular turret rings in vertical position developed at Detroit Arsenal. Tables, diagrams, and illustrations. (J2, AY)

K

## JOINING

**603-K. Flash Welding Titanium Alloys.** I. A. Oehler. *Canadian Metals,* v. 15, July 1952, p. 48.

See abstract of "Titanium Alloys Flash Welded Easily", *Steel;* item 597-K, 1952. (K3, Ti)

**604-K. Ferritic Welding Electrodes Save Alloy, Give Better Welds.** Z. J. Fabrykowski. *Iron Age,* v. 170, July 24, 1952, p. 93-97.

Savings in strategic alloys of about 85% were obtained by using ferritic instead of austenitic rods by Army Ordnance. The practice is being used on U. S. military vehicles for steel-plate thicknesses up to ⅝ in. where ballistic tests must be met. Mechanical properties of welds are tabulated. All major alloying elements are in coating. (K1, T5, Q general, ST)

**605-K. Production Problems. XVII. Broken Spring Clips.** *Iron & Steel,* v. 25, July 1952, p. 319-320.

Discusses breakage problems resulting from variation in spot welding procedure. The clips are made of 0.45-0.50% carbon steel. Photomicrographs. (K3, CN)

**606-K. Lead-Tin Alloy Plating for Solderability.** J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 99-106; disc., p. 125-135.

Present position of electrodeposited tin as a medium to aid soldering of brass, copper, and steel. Possible advantages of Pb-Sn alloy coatings, history, constitution of plating baths, addition agents, operating conditions, and solderability of deposits. 10 ref. (K7, L17, Pb, Cu, ST)

**607-K. Huge Fuel Tanks for the Stratojet Bomber.** Lawrence M. Limbach. *Machinery* (American), v. 58, July 1952, p. 204-208.

Mass production, at Ryan Aeronautical Co., San Diego, of very large Al external fuel tanks by electric resistance welding. Includes information on cleaning. (K3, L12, Al)

**608-K. A Portable Spot Welder.** *Machinery Lloyd* (Overseas Ed.), v. 24, July 5, 1952, p. 95.

Welder made by Ring Motors, Ltd., Manchester, England can weld two pieces of 14 gage sheet and has adjustable tip pressure up to 500 lb. (K3)

**609-K. Lead Welded by Inert-Gas Shielded-Arc Process.** *Materials & Methods,* v. 36, July 1952, p. 97.

Advantages of this method for joining lead. (K1, Pb)

**610-K. Low-Temperature Embrittlement of Welds.** *Metal Progress,* v. 62, July 1952, p. 166, 168, 170, 172, 174. (Condensed from "Microcracks and the Low-Temperature Cooling Rate Embrittlement of Welds", A. E. Flanigan and M. Kaufman.)

Previously abstracted from *Welding Journal.* See item 107-K, 1952 (K9, Q23, CN)

**611-K. How to Solder Stainless Steel.** E. M. Rains. *Sheet Metal Worker,* v. 43, July 1952, p. 52-53.

Pictorial presentation. (K7, SS)

**612-K. Resistance Welding Applications Increase.** *Steel,* v. 131, July 21, 1952, p. 91-96, 98.

A special report to show wide possibilities of resistance welding as a means of cutting fabrication costs.

The process in general and its six types; welding controls; power supply; and electrodes. Lists metals that can be resistance welded and numerous applications. (K3)

**613-K. Industrial Brazing: Torch Brazing.** E. V. Beatson and H. R. Brooker. *Welding and Metal Fabrication,* v. 20, June 1952, p. 220-223; July 1952, p. 248-253.
Recommended procedures. (K8)

**614-K. Rolling-Stock Construction at Eastleigh.** *Welding and Metal Fabrication,* v. 20, July 1952, p. 236-240.
Various welding operations including carbon-arc, metal-arc, spot, and "puddle" welding processes. Last type involves a burning-through step which eliminates drilling holes. (K1, K3, K6)

**615-K. High Quality Pipe Butt Welding Without Backing Strips.** A. J. P. Tucker. *Welding and Metal Fabrication,* v. 20, July 1952, p. 253-257.
A method of making fusion butt welds in mild steel piping by a metal-arc process which allows good control of root penetration. Methods of testing the welds and uses of the process. Applications of the argon-arc process to the welding of piping of 18% Cr, 8% Ni, and the 3% Cr-Mo types. Photographs and tables. (K1, ST, SS, AY)

**616-K. Garage Welding Modern Car Bodies.** Cyril C. Gee. *Welding and Metal Fabrication,* v. 20, July 1952, p. 262-263.
Technique of replacing, rather than repairing, automobile panels by spot welding. Equipment and typical procedure. (K3, CN)

**617-K. A Survey of Arc Welding in Gaseous Atmosphere.** *Welding Journal,* v. 31, July 1952, p. 349s-352s. (Translated from *Soudure et Techniques connexes,* v. 5, 1951, p. 179-181.)
Historical review of successful and unsuccessful attempts to provide arc shielding of the molten weld metal from atmospheric contamination. 26 ref. (K1)

**618-K. Slope Taper Control in Spot Welding 24ST Aluminum.** I. W. Johnson. *Welding Journal,* v. 31, July 1952, p. 549-551.
Addition of taper control to the standard slope control greatly simplifies spot welding of material such as 24S-T Al. (K3, Al)

**619-K. Welding Light-Gage Tubing in Gas Refrigerators.** J. A. Ritter. *Welding Journal,* v. 31, July 1952, p. 552-560.
Manufacture of the refrigerating unit installed in the Servel household refrigerator including material, personnel, and methods. Material is SAE 1010 steel and process is oxy-acetylene welding. (K2, CN)

**620-K. Military Aeronautical Spot and Seam-Welding Specifications.** J. Maltz and N. E. Promisel. *Welding Journal,* v. 31, July 1952, p. 561-566.
Development of above specifications. (K3, S22)

**621-K. Process Control for Resistance Welding Under Government Specifications.** Frank G. Harkins. *Welding Journal,* v. 31, July 1952, p. 567-574.
A realistic approach to conformance with MIL specifications 6858 and 6860 which deal with resistance welding of ferrous materials, Ni and Co-base alloys, and light metals. Data from 15 machines involving 3280 tension-shear tests and 570 macro-etch specimens on 10 gages of material. A relationship between nugget diameter and tension-shear value has been established. A tentative statistical-control procedure which will not permit production of substandard welding. (K3, S22)

**622-K. Inert-Gas-Shielded Arc Consumable Electrode Welding.** H. E. Rockefeller. *Welding Journal,* v. 31, July 1952, p. 575-586.
The sigma welding—equipment, gases, electrodes, current, and some interesting applications. Specifically covers Al, Cu, carbon and stainless steels. Numerous diagrams, tables, graphs, and illustrations. (K1, Al, Cu, CN, SS)

**623-K. Problems and Equipment in Aircraft Spot Welding.** J. R. Fullerton. *Welding Journal,* v. 31, July 1952, p. 586-591.
Equipment used by Ryan Aeronautical Co. for resistance welding applications. Advantages and limitations of each type. (K3)

**624-K. New Austrian Welding Standards.** Hans Melhardt. *Welding Journal,* v. 31, July 1952, p. 592-594. (Translated and condensed from *Schweisstechnik,* v. 6, 1952, p. 1-7; 21-36.)
Diagrams, graphs, and tables. 10 ref. (K general, S22)

**625-K. Recording Voltmeter Checks Quality of Automatic Welds.** George A. Hatfield. *Welding Journal,* v. 31, July 1952, p. 600-601.
Procedure of National Supply Co. for submerged-arc welding of steel rings to steel pipes to form shoulders. (K1, CN)

**626-K.** (Dutch.) **The Smit-Unionmelt Manual Welding Apparatus.** P. J. Verlee. *Smit Mededelingen,* v. 7, Apr.-June 1952, p. 45-49. (K1)

**627-K.** (Dutch.) **Relationship of Welding Current Strength to Translucency Factors in Welding Fluxes.** Th. Rosskopf. *Smit Mededelingen,* v. 7, Apr.-June 1952, p. 52-58.
Develops a formula for the most favorable ratio between translucency and welding current, from which optimum welding conditions and fluxes can be determined. Tables and graphs. (K1)

**628-K.** (French.) **Stitching; a New Efficient, Rapid, and Inexpensive Process.** D. Y. Gastoué. *Revue de l'Aluminium,* v. 29, May 1952, p. 196-197.
Process for joining sheet metal. Application to Al. (K13, Al)

**629-K.** (French.) **Argon-Arc Welding of Light Metals; Preparation for Their Welding by the Nertal Process.** Charles Guinard. *Revue de l'Aluminum,* v. 29, May 1952, p. 207-213.
Surface state, selection of welding rods, the various welding techniques, and edge preparation. Tables, graphs, macrographs, and illustrations. (K1, Al)

**630-K.** (French.) **Improvements in Setting of Large Diameter Rivets.** Charles Guinard. *Revue de l'Aluminum,* v. 29, June 1952, p. 249-255.
As applied to thick sheets of light metals. French and foreign methods for handling these problems. Tables and macrographs. (K13, Al, Mg)

**631-K.** (French.) **Repairing by Aluminothermic Welding.** P. Drumare. *Soudure et Techniques connexes,* v. 6, May-June, 1952, p. 129-137.
Repair of various objects, including coupling rods, gears, crushers, blooming-mill pinions, crankshafts, etc. Photographs and micrographs. (K6, ST)

**632-K.** (German.) **Synthetic Cement as Bonding Material.** P. Voigt. *Chemische Technik,* v. 4, Apr. 1952, p. 177-181.
Production, mechanical properties, and uses of a cement for metals which cannot conveniently be joined by welding, riveting, or other means. Photographs, tables, and diagrams. (K12)

**633-K.** (German.) **Welding in Pipeline Construction.** H. Jansen. *Erdöl und Kohle,* v. 5, June 1952, p. 350-357.
Various types of welding, such as butt welding and sleeve joint welding, in their application to pipeline construction. Thermal treatment of weldments. Includes micro and macrographs. (K general, J1, CN)

**634-K.** (German.) **Practical Tests on Weldability and Resistance to Weld Cracking of Steel.** W. Felix. *Schweizer Archiv für Angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 152-159.
Details of weld-bend tests, the "Kinzel" test, and tear tests. Weldability tests, and tests to determine hardening and brittleness in heat-affected weld zones. Application of results. Diagrams, tables, charts, micrographs, and macrographs. (K9, ST)

**635-K.** (German.) **Technique of Welding and Cutting.** K. Becker. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 555-558.
Welding, flame-cutting, and metal-spraying equipment. 77 ref. (K2, G22, L23)

**636-K. Where Weldments Reduce Scrap Losses.** Ray Zeh. *Automotive Industries,* v. 107, Aug. 1, 1952, p. 56, 80, 82.
An example of the economy sometimes achieved by weldments is shown in the double-drum cable control unit manufactured by Gar Wood Industries, Inc., for use with tractors. (K1, T4)

**637-K. Select the Right Process and Material for Joining Copper and Its Alloys.** Joseph Imperati. *Industry and Power,* v. 63, Aug. 1952, p. 83-87.
See abstract of "The Welding and Brazing of Copper Alloys," J. Imperati and Ira T. Hook, *Welding Journal,* item 103-K, 1952. (K general, Cu)

**638-K. Welded Design Provides Highest Efficiency.** *Industry & Welding,* v. 25, Aug. 1952, p. 36-37.
Welding operations in production of portable generators for aircraft at Motor Generator Corp. (K1)

**639-K. Here's How Thermit Welding Speeds Ship Repairs.** *Industry & Welding,* v. 25, Aug. 1952, p. 44-45.
Picture story. (K4, ST)

**640-K. Here's How to Weld Magnesium.** *Industry & Welding,* v. 25, July 1952, p. 50-51, 53-54, 57; Aug. 1952, p. 46, 49-50, 66-67.
Gas and inert-arc welding of magnesium alloys. Characteristics of Mg melts, weldability, heat treatment, cleaning, corrosive fluxes, high-frequency welding, use of water-cooled torch, semi-automatic arc welding, resistance welding, brazing, and stress relief. (K general, J general, Mg)

**641-K. Brazing With Metal Powder.** H. W. Greenwood. *Machinery* (London), v. 80, July 17, 1952, p. 98-99.
Procedures and brazing alloys for joining various metals, and for metal-nonmetal joining. (K8, SG-f)

**642-K. Pressure Welding.** R. F. Tylecote. *Metal Industry,* v. 81, July 18, 1952, p. 43-46; July 25, 1952, p. 72-73.
Theory and practice of joining metals by pressure by solid-phase welding, that is at temperatures where there is no liquid slag or low-melting point metallic constituents present to assist welding. Tables, graphs, and micrographs. 15 ref. (K5)

**643-K. Aluminum Fuel Tanks Are All-Welded.** *Steel,* v. 131, July 28, 1952, p. 81-82.
Manufacture at Ryan Aeronautical Co.; no rivets are used. Over 30,000 electric spot welds join the Al alloy sheets. (K3, Al)

**644-K. High Chromium Stainless as a Substitute for 18-8. Part II. Welding, Brazing, Polishing.** Lester F. Spencer. *Steel Processing,* v. 38, July 1952, p. 340-343, 350.
Includes tables and photomicrographs. 11 ref. (K general, L10, L12, SS)

**645-K. Pumps and Oil-Field Tools. Parts I and II.** F. R. Drahos. *Welding Engineer,* July 1952, p. 36-39; Aug. 1952, p. 40-41.

Part I: Welding operations in the manufacturing of pumps. Includes submerged-arc, inert-arc, and manual-arc processes for such materials as stainless, carbon, and cast steel, and Ni-base alloys. Application of a stainless-steel overlay. Part II: Manufacture of oil-well tools, most of which are large castings of high-hardenability and heat treatable steels. Solutions to various welding problems. (K1, L24, SS, CN, Ni)

**646-K. Steel Welded by Inert-Arc Metal-Arc.** *Welding Engineer,* v. 38, Aug. 1952, p. 23, 64.

Solar Aircraft Co., San Diego, Calif., has developed new techniques and applications for this process. A consumable electrode in the form of a wire of the required diameter is fed automatically to the gas-shielded arc. Advantages. (K1, ST)

**647-K. Specialist in Hard Jobs.** Fred M. Burt. *Welding Engineer,* v. 38, Aug. 1952, p. 29-31.

Arc and gas welding equipment and procedures of Automatic Welding Co., Inc., Los Angeles. Jobs considered include welding of SAE 4140 steel, alloy steel wire, and seamless Al tubes. (K1, K2, AY, Al)

**648-K. Welding—Inside and Out.** Paul A. Rodecki. *Welding Engineer,* v. 28, Aug. 1952, p. 36-37, 66.

Special considerations needed in the welding of Al storage tanks for commercial fatty acids. (K1, Al)

**649-K. Diversified Welding.** Howard Jackson. *Welding Engineer,* v. 38, Aug. 1952, p. 42-44, 62.

Work of Flohr & Co., metal fabricator of Seattle, Wash., whose job shop produces tailor-made items for industrial plants belonging to building construction, marine, pulp and paper, chemical food production industries, and for gasoline and oil distribution plants. Systems used include spot, arc, inert-arc metal-arc, and tungsten-arc welding. (K1, K3, ST, SS)

**650-K. New Service for Flash Welding.** W. C. Henzlik. *Welding Engineer,* v. 38, Aug. 1952, p. 45-46, 48.

Unusual services of Flashweld Industries, Inc., of Franklin Park, Ill. Offered to customers are: education in flash welding, experimentation leading to product design or redesign, contract maintenance, and contract jobbing. (K3)

**651-K. What Per Cent of Your Welding Electrodes Do You Use?** T. Jefferson. *Welding Engineer,* v. 38, Aug. 1952, p. 51.

A graph based on results obtained from $\frac{3}{16}$-in. heavily coated electrodes 14 in. in length. (K1)

**652-K.** (Spanish.) **Completely Welded Ship Hull. Practical Consequences of the Results Obtained During Their Construction and Maintenance.** Erich Volbrecht. *Ciencia y Técnica de la Soldadura,* v. 2, Jan.-Feb. 1952, 10 pages.

Construction of a series of torpedo-boat hulls, and various problems involved. Includes schematic diagrams. (K1, T22, CN)

**653-K.** (Spanish.) **Complementary Materials in the Welding of Steel.** A. Matting. *Ciencia y Técnica de la Soldadura,* v. 1, Nov.-Dec. 1951, 10 pages.

Composition and characteristics of the most important complementary welding materials, their behavior during melting, special electrodes used in arc welding, and cracking. Includes photomicrographs. (K1, ST)

**654-K.** (Spanish.) **Gases and Nonmetallic Inclusions in Electric-Arc Welding.** Jose Maria Sistiaga. *Ciencia y Técnica de la Soldadura,* v. 2, Jan.-Feb. 1952, 6 pages.

Presence of porosity, the formation of nitrides and the nature and origin of some nonmetallic inclusions in welded steels. A thin iron-oxide-base electrode coating is used. Influence of these factors on mechanical properties of the weld metal. Includes photomicrographs. (K1, ST)

**655-K.** (Spanish.) **Present Status of Welded Construction With Light Metals.** A. Matting. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug. 1951, 11 pages.

Methods of welding Al and light alloys of different types by various processes, including results obtained in corrosion and tensile strength tests. Photomicrographs. (K general, Q27, R general, Al)

**656-K. Instrumentation Minimizes the Welding Variable.** J. Heuschkel. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 41-48.

Variables associated with welding processes, together with instruments which measure and control the variables. Electric resistance welding, arc-welding, gas welding, brazing, thermit welding, and pre and post-welding instrumentation. Diagrams, graphs, and photographs. (K general)

**657-K. Sigma Welding Stars on 3 New Jobs.** Frank Harkins. *American Machinist,* v. 96, Aug. 18, 1952, p. 109-111.

Specially designed equipment at Solar Aircraft Co. for inert-gas welding. Mild and low-alloy steels, dissimilar metals (low-alloy + stainless), and stainless sections as thin as 0.050 in. are welded automatically at speeds up to 10 times those formerly obtainable. (K1, CN, AY, SS)

**658-K. Automatic Welding Makes Eyebolts Faster, Better.** W. H. Volkmar. *American Machinist,* v. 96, Aug. 18, 1952, p. 127.

Simple automatic submerged-arc setup yielding cost savings up to 30% over manual welding. (K1)

**659-K. Good Welding Techniques Aid Repointing of Dipper Teeth.** *Iron Age,* v. 170, Aug. 14, 1952, p. 137.

New techniques permit using smaller replacement tip, retaining more of original tooth. Result is saving of Mn steel. A Cu-Mo-Mn welding electrode works best. (K1, T5, AY)

**660-K. Selecting the Correct Welding Process.** John J. Chyle. *Machine Design,* v. 24, Aug. 1952, p. 182-185, 265-266, 268.

Systematic analysis of methods, classified under the seven most important factors involved. Tables show recommended welding processes for different materials and for different joint designs. Graph shows comparative costs. (K general)

**661-K. German Report on Welding in the U. S.** *Metal Progress,* v. 62, Aug. 1952, p. 146, 148, 150, 152, 154. (Condensed from "Welding Technology in the U. S. A.", H. Von Hofe, E. Kauhausen, H. Koch, K. L. Zeyen, and E. Zorn, *Schweissen und Schneiden,* v. 3, Dec. 1951, p. 359-370.)

Observations made by the German members of Tour Group 5 (Welding and Joining) during their visitations to American plants as part of the program of the first World Metallurgical Congress. (K general)

**662-K. Design Properties of Brazed Joints for High-Temperature Applications.** Robert L. Peaslee and Willard M. Boam. *Welding Journal,* v. 31, Aug. 1952, p. 651-662.

Brazing of stainless steel for high-temperature work with a reducing atmosphere and Ni-Cr-base alloy, using suitable procedures and equipment. (K8, SS, SG-h)

**663-K. 1951 Adams Lecture: The Welding of Copper by the Inert-Gas Metal-Arc Process.** John J. Chyle. *Welding Journal,* v. 31, Aug. 1952, p. 663-686.

History of discovery of Cu, outlines smelting and refining practice, mechanical properties, and other welding processes. Details of inert-gas metal-arc process. Mechanical and electrical conductivity properties and microstructures of the welds. Pressure-vessel-fabrication procedure. 35 ref. (K1, Cu)

**664-K. Production Welding 24ST3 Aluminum Using Slope Control.** Robert E. Kemp. *Welding Journal,* v. 31, Aug. 1952, p. 687-691.

Some techniques and equipment developed for the successful production resistance welding of Al. Micrographs and macrographs. (K3, Al)

**665-K. Resistance Welding Quality Control.** Thomas J. Lepito and Robert M. Taylor. *Welding Journal,* v. 31, Aug. 1952, p. 692-698.

Quality control in jet-engine fabrication, including chemical analysis and dimensions of material, equipment, machine settings, and testing of completed welds. Experimental work was done on AMS-5510 material. Diagrams, macrographs, and micrographs. (K3, ST)

**666-K. Effect of Vibration on Weld Metal.** John W. Welty. *Welding Journal,* v. 31, Aug. 1952, p. 361s-366s.

Effects of vibration on microstructural solidification pattern and on mechanical properties of AISI Type 321 and 347 steel during both arc and resistance welding. Apparatus; photomicrographs illustrate typical results. (K1, K3, N12, Q general, SS)

**667-K. Seam Welding of 0.005-In. Inconel Sheet.** E. F. Nippes and John M. Gerken. *Welding Journal,* v. 31, Aug. 1952, p. 366s-370s.

It was found that 0.005-in. annealed Inconel could be seam welded using an electrode force of 75 lb. with a low-inertia moving electrode, a current of 1350-1425 amp., a sequence of ½ cycle "on", 4 cycles "off" with a 60 cps. supply and 40 welds per in. Special seam-welding machine with a low-inertia head. Double-seam welds were made with the second seam at the edge of one sheet. (K3, Ni)

**668-K. Porosity in Mild Steel Weld Metal.** Donald Warren and R. D. Stout. *Welding Journal,* v. 31, Aug. 1952, p. 381s-386s.

Reviews literature on each of the factors affecting porosity in mild-steel weld metal. 39 ref. (K9, CN)

**669-K. Evaluation of the Circular-Patch Weld Test.** John E. Hockett and L. O. Seaborn. *Welding Journal,* v. 31, Aug. 1952, p. 387s-392s.

Applicability of the circular-patch weld test as a means of determining weldability. The type of specimen used has high biaxial residual stresses which promote cracking. Possibility of utilizing such a test to predict probability of cracking or brittle behavior under external load, as in service. Bending four series of unnotched Unionmelt-welded mild steel patches and one set of manually welded patches at several temperatures to determine what effects welding variables had on transition temperature. 24 ref. (K9, CN)

**670-K.** (Book) **Welding Practice. Vol. I. Welding Methods and Tests.** R. Fuchs and H. Bradley, editors. 130 pages. 1951. Butterworth's Scientific Publications, Ltd., 4-6 Bell Yard, Temple Bar, London, 2, W.C., England. 17s 6d.

Intended to meet the practical welding needs of designers, draftsmen, engineers, and foremen. Five main subjects are: welding proc-

# national metal congress and exposition philadelphia

# *a message from the president*

THE SWORD and plowshare symbol of the 34th National Metal Congress and Exposition reflects the grave problems and serious dilemmas facing the world today. The slogan "Metal Keeps the Peace" is a token of the importance of the metals industry—and its vital responsibilities—in maintaining the delicate balance between sword and plowshare.

A parallel might be drawn between the National Metal Congress and the assemblies of the United Nations. Only through cooperation and compromise, through exchange of information, through thorough understanding of each other's problems and ways of life is the success of the UN's ultimate purpose insured—to keep the peace. A similar philosophy draws together at the Metal Show an assortment of engineers, metallurgists, researchers, designers, production men and executives. Here the supplier of metal has an opportunity to envisage and understand the problems of the fabricator and consumer; the research worker finds out that a confrere all the way across the continent has found the answer to a problem he is worrying about; competitors get a chance to look at each other's products. Thus do the metal industries learn to work together; and only through such cooperative efforts can they bolster their country's position on the international scene and help keep the peace.

It is not surprising, therefore, that the Metal Show itself was sold out months ago, in spite of the fact that more space was allotted than ever before. There is no question but that it will be the biggest and most important concentration of metallurgical talent and facilities yet to be assembled.

But the power of the Metal Congress in these crucial times lies not in its physical bigness, but rather in what it is able to give to the individual who attends. For he cannot help but carry home a wealth and variety of information and new ideas that will stimulate him and his company to more effective and intensified production efforts to "keep the peace".

Four leading technical societies are cooperating in this mutual exchange of information—the American Society for Metals, American Welding Society, Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, and the Society for Non-Destructive Testing. The pages that follow give complete details of their technical programs and all other activities. Exhibitors are listed with a brief indication of what they will have to show.

The American Society for Metals, sponsor of the National Metal Congress and Exposition, takes great pleasure in inviting all who are concerned in any way with the metal industries' contributions to world peace to attend the National Metal Congress and Exposition in Philadelphia, October 20 through 24, 1952.

John Chipman

*President, American Society for Metals*

# When in Philadelphia

### The Philadelphia Convention Visitor Should Make a Point Of Mixing Pleasure With His Show Business

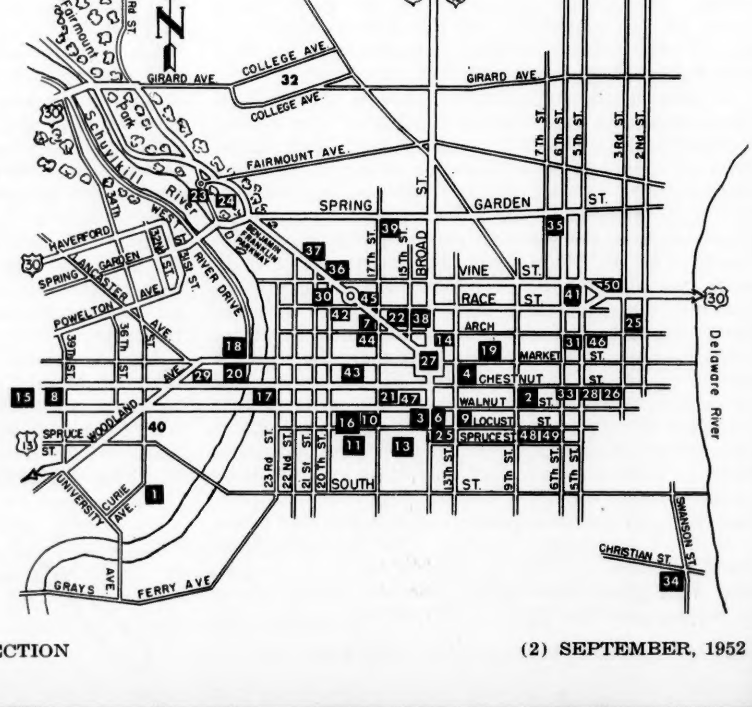
Using the map below as a guide, the Convention Visitor to Philadelphia might make good use of whatever leisure time comes his way to investigate some of the numerous points of interest for which the city is so well known. Most of the places enumerated on this map are within walking distance of intown hotels or near the Convention Hall (1), where the National Metal Exposition is being held.

The visitor's tour might take him to Independence Hall (33), the original State House of Pennsylvania, for a look at the Liberty Bell, and the important historical collection of portraits and relics. The Old City Hall (27), just across the street from Independence Hall, is where the first Supreme Court of the United States convened in 1791, and where Washington was inaugurated for his second term. Christ Church (46), was at one time attended by George and Martha Washington, John Adams, Benjamin Franklin (he and his wife are buried in the graveyard here), Robert Morris and Lafayette, and the Betsy Ross House (25), is where Mrs. Elizabeth Ross (it is reputed) made the first American flag at the request of Washington and the First Continental Congress.

The Aquarium, (23) on the east bank of the Schuylkill, has on display more than 4000 specimens of sea life; the Franklin Institute (30), the Wonderland of Science, contains action exhibits of modern transportation, aviation, physics, chemistry, electrical communications, astronomy and graphic arts, as well as a collection of Franklin, Faraday and Rittenhouse apparatus; the Rodin Museum (37) contains the Mastbaum collection of Rodin sculpture, drawings and water colors.

### Hotels and Principal Points of Interest

*1—Convention Hall. 2—Benjamin Franklin Hotel. 3—Bellevue-Stratford Hotel. 4—Adelphia Hotel. 5—Sylvania Hotel. 6—Hotel Ritz-Carlton. 7—Robert Morrison Hotel. 8—Penn Sheraton Hotel. 9—St. James Hotel. 10—Warwick Hotel. 11—Barclay Hotel. 12—John Bartram Hotel. 13—Drake Hotel. 14—Essex Hotel. 15—Walnut Park Plaza. 16— Rittenhouse Square. 17—B. & O RR Station. 18—Penn RR Station. 19—Reading RR and Bus Terminal. 20—Post Office. 21—Chamber of Commerce. 22—Academy of Fine Arts. 23—Aquarium. 24—Art Museum. 25—Betsy Ross House. 26—Carpenter's Hall. 27—City Hall. 28—Old Custom House. 29—Drexel Institute. 30—Franklin Institute. 31—Quaker Meeting House. 32—Girard College. 33—Independence Hall. 34—Old Swedes Church. 35—Edgar Allen Poe House. 36—Public Library. 37—Rodin Museum. 38—Town Hall. 39—U. S. Mint. 40—University of Pennsylvania. 41—Franklin Square. 42—Academy of Natural Science. 43—Arch St. M. E. Church. 44—Arch St. Pres. Church. 45—Cathedral of St. Peter and St. Paul (R.C.). 46—Christ Church and Benjamin Franklin's Grave. 47—First Baptist Church. 48—First Presbyterian Church (original site). 49—Holy Trinity R.C. Church. 50—St. George's M. E. Church.*



# A.S.M. Sponsors 34th National Metal Congress and Exposition

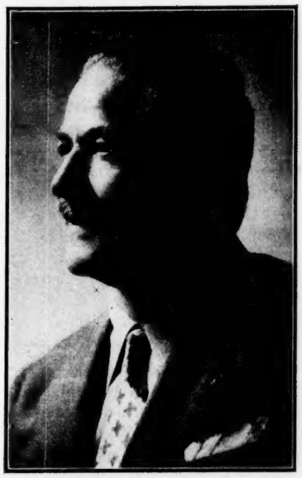
The 34th National Metal Congress and Exposition of the American Society for Metals will be held in Philadelphia from Oct. 18-24, with headquarters at the Benjamin Franklin Hotel.

The purpose of the Metal Show is to bring together the experience, the knowledge, and the means for a more effective use of metals in the making of products for civilian use, and for the making of products that will insure our defense against aggression, and thus guarantee our security and liberty. The theme "Metal Keeps the Peace" will keynote this year's convention.

Over 400 nationally known firms engaged in either the production of metals, the treatment of metals, the fabrication of metals into component parts or products, or in rendering services to all of these, will exhibit at the Exposition.

Nearly 5 acres, 210,000 sq. ft., of floor space, will be utilized by the exhibitors for the display and demonstration of their products, equipment or services. In addition, thousands of square feet of space have been set aside for special meetings, forums, lectures and other activities connected with the Congress and the Exposition.

The American Society for Metals will hold its annual Seminar on Saturday morning and afternoon, and



*W. H. Eisenman*
*Secretary, A.S.M.*

Sunday morning and afternoon, Oct. 18-19. The subject of the 1952 A.S.M. Seminar is "Modern Research Techniques in Physical Metallurgy". Throughout the week of the Congress the Society will hold morning, afternoon and evening technical sessions.

Managing director of the Congress and Exposition is W. H. Eisenman, Secretary of the American Society for Metals.

# HOW TO:

## Attend a Metal Show

FOR the person with limited time available, the problem of covering an affair as large in size and scope as the National Metal Congress and Exposition is a difficult one, and one that requires careful advance planning. Experience has shown that *preliminary study* of the program and the list of exhibits (shown on p. 18—Metal Show Section) will help in laying out a workable and profitable individual itinerary. Regardless of time limitations and the care with which the itinerary has been mapped out in advance, it is invariably desirable to make one "whirlwind tour" of the entire exhibit before concentrating on details, in order to discover details which may have been overlooked in mapping your course. After having decided on what is of most interest to you, find a quiet corner and take time to mark your exhibitor's list, your map and your program. If you are not covering the show alone, this is also a good time to subdivide the coverage task among the group—whose individual findings later can be consolidated into a group report.

Because of the danger of losing sight of the main objective of your visit to the Show, it is always well to remember that your primary reason for attending is to discover ways and means of making better things cheaper. From the standpoint of materials, that means that you must look for something which is equal to what you are using but less expensive, stronger than what you are using, will use less material, that can be processed with less scrap loss, processed cheaper, and will require little or no finishing, and will have increased sales appeal.

Your job as ambassador to the Metal Show and Congress calls for efficient use of brains as well as feet.

**A. S. M. Annual Meeting**
**To the Members of A.S.M**

This is your official notice that the annual meeting of the American Society for Metals will be held in the Benjamin Franklin Hotel, Philadelphia, on Wednesday morning, Oct. 22, 1952. All members of the Society in good standing are privileged to attend and vote.

W. H. EISENMAN, Secretary
**Cleveland, Ohio**
**September 1, 1952**

## A.S.M. To Sponsor Three Educational Lectures at National Metal Congress

The American Society for Metals is sponsoring three educational lecture courses during the week of the National Metal Congress and Exposition in Philadelphia this year.

The first course, "Behavior of Metals at Low Temperatures", will consist of three lectures presented in two sessions, at 4:30 p.m., and at 8:00 p.m., on Monday, Oct. 20. R. M. Brick, University of Pennsylvania, J. R. Low, Jr., Knolls Atomic Power Laboratory, and C. H. Lorig, Battelle Memorial Institute, will present the lectures in the first course.

"Gases in Metals", the second course, will be presented at 4:30 p.m. on Tuesday, Oct. 21, and at 4:30 p.m. on Wednesday, Oct. 22. Speakers at these sessions include D. P. Smith, Princeton University, L. W. Eastwood, Kaiser Aluminum Co., D. J. Carney, United States Steel Co., and C. E. Sims, Battelle Memorial Institute.

J. Alfred Berger, acting department head, department of metallurgical engineering, University of Pittsburgh, will conduct the third course, "Metallurgical Tools for Alloy Conservation and Increased Production". He will present four lectures, two on Tuesday, Oct. 21, and two on Wednesday, Oct. 22, starting at 8:00 p. m. each day.

*J. Alfred Berger*

All of the educational sessions will be held in the Ballroom at Convention Hall. They will be open without charge to anyone attending the Congress and Exposition.

N. J. Grant, Massachusetts Institute of Technology, is chairman of the A.S.M. Educational Committee which was in charge of planning and arranging these lecture courses.

# Gold Medal and Research Medal to Mehl and Craig

*Robert F. Mehl*
*Recipient of Gold Medal*

## Gold Medal Award

Robert F. Mehl, chairman of the Metallurgical Advisory Board of the National Academy of Sciences, National Research Council, and head of the department of metallurgy at Carnegie Institute of Technology, was the unanimous choice of the Committee for the A.S.M. Gold Medal Award for 1952 to be the recipient of the Gold Medal. Presentation will be made at the annual banquet of the Society, to be held in the grand ballroom of the Benjamin Franklin Hotel, Philadelphia, on Oct. 23.

The Gold Medal was established in 1943 to recognize outstanding metallurgical knowledge and exceptional ability in the diagnosis and solution of diversified metallurgical problems.

For 20 years Dr. Mehl has exerted a powerful influence on the development of metallurgical education in the United States. His long tenure at the Carnegie Institute of Technology has been marked by a steady flow of well-educated undergraduates into the mills and laboratories of the metal industry, and a great amount of research performed under his direction has set standards and defined trends in physical metallurgy that are well recognized in the profession.

Dr. Mehl's researches began in 1931 with the initiation of comprehensive studies of Widmanstatten structures to determine the mechanisms by which solid-to-solid transformations occur in metals, and these have played an important part in the theoretical study of age-hardening phenomena, also largely associated with his laboratory. He has made detailed investigation of the structure and mode of formation of pearlite, reported as a Campbell Lecture before A.S.M. in 1941, as well as fundamental studies on diffusion, crystal nucleation and grain growth, all of which have had an important bearing on our present understanding of the microconstituents and hardenability of steel.

Dr. Mehl's indirect influence on industrial metallurgy has been felt many times through the medium of his former students. As an example of his direct contributions to practical metallurgy one may cite the reports of the investigations which he made for the Metallurgical Advisory Board during the late war. This work has been appraised as "probably the most important war-time contribution to gun tube manufacture from the standpoint of cost and time-saving, smooth production and clear understanding of the physical test results".

Dr. Mehl received the Sauveur Achievement Award for 1951, and he is the recipient of many other honors and awards, including the Henry Marion Howe Medal of the A.S.M. for the best paper in the 1939 *Transactions*, and the Campbell Memorial Lectureship in 1941. He has been active on national committees of the A.S.M., as well as the A.I.M.E., whose Institute of Metals Division he served as chairman in 1938.

## A.S.M. Medal for the Advancement of Research

Cleo F. Craig, president of the American Telephone and Telegraph Co., has been unanimously recommended by the 1952 Committee on the Medal for Advancement of Research, to be the recipient of the award.

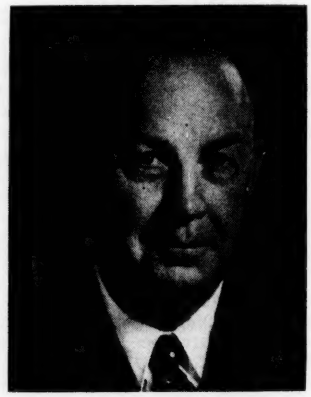
Mr. Craig has been for many years a director of the Bell Telephone Laboratories as well as an official of A. T. and T. His support of Bell Laboratories and the distinction which these laboratories have attained in metallurgical research are the reasons underlying the recommendation for this award.

The Medal for Advancement of Research, which was founded by the American Society for Metals in 1943, sets forth the following qualifications for the award candidate:

"He shall be an executive in an industrial organization, the principal activity of which is the production and fabrication of metals. He shall be one who, over a period of years, has consistently sponsored metallurgical research or development, and, by his foresight and influence in making available financial support, has helped substantially to advance the arts and sciences related to metals."

**Avoid Delay at the Registration Desk**

**See page 24 for Advance Registration Coupon; your badge giving admittance to the National Metal Exposition will be mailed to you.**



*Cleo F. Craig*
*Recipient of Advancement of Research Medal*

Metallurgical research forms an important part of the basic scientific studies carried on by the Bell System for the advancement of electrical communications. Cleo F. Craig, during his long service in the System as an engineer and as an executive in the management of operating and engineering activities, has taken keen interest in the improvement and extension of communication through research. As a member of the Board of Directors of the Bell Telephone Laboratories for over eight years, and subsequently as president of the American Telephone and Telegraph Co., he has supported and promoted metallurgical research by giving his active encouragement and approval to the Laboratories' programs.

Metallurgical advances have been made in magnetic alloys having permabilities manyfold greater than were previously available. Economies in storage battery operation and improvements in cable sheath manufacture and performance have come from studies in lead alloys. Alloys have been developed which give long service in the billion electrical relay contacts in the telephone system and alloys which give great stability and other unique merit to vacuum tubes and electrical filtering devices.

In the field of semiconductors, the application of metallurgical research methods to the preparation of germanium and silicon of extreme purity and of very precisely controlled impurity have formed an essential base for the invention and development of the transistor.

# *Desch Elected Honorary Member of A.S.M.*

C. H. Desch, probably one of the greatest British classical metallurgists now living, has been elected an Honorary Member of the American Society for Metals. An Honorary Member is one determined by the A.S.M. Board of Trustees to have made exceptional contributions to the field of metallurgy. The total number of living Honorary Members shall not at any time exceed 25.

Dr. Desch was born in 1874 and educated at University College, London, and Wurzburg University. He joined the metallurgical department of King's College, London in 1902, and then took up an appointment as lecturer in metallurgical chemistry at Glasgow University, where he remained from 1909 until the end of World War I. For the next two years he was professor of metallurgy at the Royal Technical College, Glasgow, and was appointed to the chair of metallurgy at Sheffield University in 1920.

From 1932 to 1939 Dr. Desch was superintendent of the metallurgy division of the National Physical Laboratory. On his retirement he was appointed to the board of directors of Messrs. Richard Thomas and Co., Ltd., to direct the research and development activities of that company, and was later associated with the Whitehead Iron and Steel Co., Ltd., as technical advisor.

Dr. Desch was elected a fellow of the Royal Society in 1923 and was president of the Faraday Society from 1926-28, president of the Institute of Metals from 1938-40, and president of the Iron and Steel Institute from 1946-48. He was the recipient of the honorary degree of Doctor of Law, was awarded the Bessemer Gold Medal of the Iron and Steel Institute in 1938, and the Platinum Medal of the Institute of Metals in 1941. Dr. Desch was the George Fisher Baker lecturer at Cornell University in 1931.

Dr. Desch has published numerous important papers and books. Among the more familiar of his books are: Metallography, Intermetallic Compounds, and Chemistry of Solids. He has published a memoir on "Substitute Materials in War and Peace", and a series of nine reports to the British Association on the source of the metal used by ancient civilizations.

Dr. Desch is a member of the Institute of Sociology and has written a number of papers on sociology, including a booklet on "Science and the Social Order".

Dr. Desch takes his place beside other eminent metallurgists who have been elected Honorary Members of the Society in the past, such as Benjamin F. Fairless, Axel Hultgren, Zay Jeffries, Charles F. Kettering, Kotaro Honda, and Willis R. Whitney.

## College Alumni Groups To Hold Annual Luncheons

Special luncheons to be held during the week of the National Metal Congress and Exposition will include some 25 schools and colleges, the annual luncheon of the Canadian chapters of the American Society for Metals, and the Battelle Alumni Luncheon. All college luncheons will be held on Wednesday, Oct. 22, at the Benjamin Franklin Hotel at 12 noon. The Canadian and Battelle luncheons will be held Tuesday, Oct. 21, at the Benjamin Franklin Hotel at 11:30 a.m.

Tickets for all the luncheons will be on sale at the registration desks at the Benjamin Franklin Hotel, and at the Convention Hall. Tickets must be purchased by 6 p.m. Tuesday for the college luncheons.

The colleges participating in the luncheons are as follows: Carnegie Institute of Technology, Case Institute of Technology, Columbia, Cornell, Fenn, Illinois Institute of Technology, Lafayette, Lehigh, Massachusetts Institute of Technology, Missouri School of Mines and Metallurgy, Ohio State, Pennsylvania State College, Purdue, Rensselaer, Stevens Institute of Technology, Yale, the universities of Cincinnati, Illinois, Kentucky, Michigan, Minnesota, Notre Dame, Pennsylvania, Pittsburgh, Wisconsin, and Worcester Polytechnic Institute.

## Industrial Gas Breakfast

The Industrial Gas Breakfast and meetings of the Metals and Industrial Processing Committees of the American Gas Association will be held Wednesday, Oct. 22, during the National Metal Show, at the Penn Sheraton Hotel.

### October Metal Progress to Feature Show

A special feature of the October issue of Metal Progress will be a classified tabulation of products being displayed by the exhibitors at the Metal Show. Some of the more notable products will be described and illustrated in specially prepared editorial text corresponding to each of these categories.

Products will be listed and described under the headings of metals and alloys, metals manufacture, metal components, tooling, heat treating, temperature indicators and controls, welding, cleaning and finishing, testing and inspection, and industrial equipment.

## S.N.T. Aims for Lower Production Costs Through Nondestructive Testing

The 12th Annual Meeting of the Society for Non-Destructive Testing, Inc. will be devoted to the most important problems facing the management of American industry today. The introduction and proper use of nondestructive tests are the most powerful tools now available to management of modern industry with which to lower production costs and improve product quality. It can reduce a highly significant, but frequently unrecognized, portion of production costs and increase industrial productivity.

The eight technical sessions of the S.N.T., to be held simultaneously in Philadelphia with the annual meetings of the American Society for Metals, the American Welding Society, and the Institute of Metals Division of the A.I.M.E. will provide management with valuable analyses of the economic factors, effective applications, and potential savings available to them through nondestructive tests. Modern new developments in nondestructive testing equipment, techniques, and fields of application are presented, along with factual data on their effectiveness in production.

Most of the papers will be presented by outstanding industrial and management engineering executives in the airframe, electrical, metallurgical, chemical, heavy equipment and nondestructive testing industries. Others will be presented by leaders in research and quality control, and others by ordnance, armament, naval, and atomic energy military production organizations. Each speaker is an authority in his field, and has a significant new contribution to make to industrial management.

The complete program for the four-day meeting appears on p. 12.

The registration fee, covering all sessions of the Meeting, is $3 to non-members, with no charge to members in good standing. The complete proceedings of the Meeting, which will be published in the Society's journal, *Non-Destructive Testing,* together with registration, are available at a total cost of $10.

## Chapter Secretary To Be A.S.M. Guest at Show

H. E. Habecker, secretary of the Rockford Chapter of the American Society for Metals for the past 20 years, has been invited by the Society to be its guest during the National Metal Congress in Philadelphia, in recognition of his loyalty and faithful service through these years.

Mr. Habecker is production manager at the Mattison Machine Works in Rockford, Ill.

## Metals Section, S.L.A. To Hold Regional Meeting At National Metal Congress

The Metals Section of the Special Libraries Association is again planning a regional meeting during the National Metal Congress, which will feature papers and discussions of mutual interest to metallurgists and technical librarians.

"New Horizons in Literature Searching" will be the theme of the opening meeting on Monday, Oct. 20, at the Benjamin Franklin Hotel. The program will include a report of the Interim Committee on Literature Classification, which is currently exploring the possibilities of international cooperation in metallurgical literature classification. Several papers on various types of automatic machines being developed for literature handling will be presented, followed by an open discussion.

Two sessions on Tuesday will include papers on availability of government research reports, problems of foreign language literature, and the functions of the technical library. The Tuesday morning meeting will be held at the Engineers Club and the afternoon session at the Benjamin Franklin Hotel. The complete program is given on page 16.

A miniature functioning library will also be maintained by the Special Libraries Association in a booth at the National Metal Exposition. A librarian qualified to answer questions and provide information about metallurgical literature will be in continual attendance throughout the Congress.

The meeting program is under the direction of F. M. Ethridge, supervisor of libraries, Consolidated Mining and Smelting Co. of Canada, Ltd., chairman of the Metals Section.

The exhibit will be co-sponsored by the S-T Council of Philadelphia, Kate Ornsen of Sun Oil Co., chairman. Rose Lonberger, librarian of Town Scientific School, University of Pennsylvania, and Walter Kee of E. I. du Pont de Nemours & Co., will serve as co-chairmen of the booth.

## A.S.M. Seminar on Modern Techniques in Physical Metallurgy Research

The American Society for Metals will hold its annual seminar on Saturday and Sunday mornings and afternoons, Oct. 18-19, at the Benjamin Franklin Hotel in Philadelphia. There will be a special demonstration session on Saturday evening. The subject of this year's seminar is "Modern Research Techniques in Physical Metallurgy".

Fourteen papers will be presented by some of the top physical and theoretical metallurgists of the country. Metallographic, diffraction, mechanical, and ferromagnetic and radio-active methods in physical metallurgy will be discussed in great detail.

The seminar has been arranged under the direction of Morris Cohen, professor at Massachusetts Institute of Technology, coordinator. Chairman of the A.S.M. Seminar Committee is R. M. Brick, of the University of Pennsylvania. The complete program is given on page 11.

## Committee of Philadelphia Wives Prepares Program For Ladies' Entertainment

Ladies who attend the National Metal Congress and Exposition but who are not interested in matters metallurgical will be entertained by a special program of planned events, to include varied tours of the historical and other points of interest in Philadelphia, and special luncheons each day of the Show.

Registration desks will be maintained for the ladies at the headquarters hotels of the cooperating societies, as follows:

American Society for Metals—Benjamin Franklin Hotel, Independence Room.

American Welding Society—Bellevue-Stratford Hotel, Blue Room.

Society for Non-Destructive Testing — Hotel Sylvania, Registration Desk.

American Institute of Mining & Metallurgical Engineering (Institute of Metals Division)—Hotel Adelphia, Registration Desk.

The program is being prepared by a committee of Philadelphia chapter members' wives. Hostesses will be on hand at the various hotels to invite the ladies to be present at all the functions.

A small registration fee will be charged to cover a portion of the expenses involved.

## *A.W.S. Sponsors 33rd National Meeting*

The 33rd National Fall Meeting program of the American Welding Society, held concurrently with the National Metal Congress and Exposition in Philadelphia the week of Oct. 20, provides for three simultaneous technical sessions Monday afternoon, Oct. 20, all day Tuesday and Wednesday, Oct. 21 and 22, and Thursday and Friday mornings, Oct. 23 and 24.

The meeting will open with the annual awarding of prizes, followed by the Adams Lecture, "Welding and Brazing of Titanium Alloys", by C. B. Voldrich, Battelle Memorial Institute, at 10:30 a.m. Monday.

Special features of the National Fall Meeting include a reception for C. H. Jennings, president of the Society, on Monday evening; plant visits to the Philadelphia Navy Yard and Westinghouse Electric Corp., Wednesday morning; a University Research Conference on Wednesday evening; and the annual business meeting, followed by the annual dinner, Thursday afternoon and evening.

An Educational Lecture Series on "Inert Gas Metal-Arc Welding Processes" will be given by W. H. Wooding of the Philadelphia Naval Shipyard on Oct. 21 and 22 at 4:30 p.m.

*Charles H. Jennings*
*President—A.W.S.*

An unusually attractive technical program includes papers on fabrication procedures, resistance welding, hard facing and flame hardening, weldability, structural welding, brazing and bronze welding, welding of nonferrous metals, maintenance and gas cutting, inert arc welding, welding in marine construction, and pipe welding.

## Typical Letter From W.M.C. Conferee

For the past 12 months, A.S.M. national headquarters has been receiving favorable comments from World Metallurgical Congress conferees relative to their visits to the United States and the W.M.C. Following is a typical example of the good-will communications that have been arriving so often:

> Shortly before I left for my vacation I had the great pleasure of receiving the books you had announced to me in your February letter. Since my return I have been spending many hours reading the Metals Handbook, the Corrosion Handbook, and all the others I had selected in Detroit last October. You will hardly be able to imagine what a surprise and pleasure it was to me to be able to own such exquisite books. They will be a great help to me in my daily work and at the same time a vivid reminder of happy weeks of learning and mutual understanding in the States. Again I want to thank you for this unique gift.

# METAL SHOW NEWS
## *Dateline:* Philadelphia, Oct. 20-24

**A month-by-month preview of the National Metal Congress and Exposition**

SEPTEMBER—Every year exhibitors at the big Metal Show send out thousands of invitations to customers, prospects and interested people in the vast metals industries. Just as regularly, despite the fact that the printed invitation bears urgent and ample warnings about the smartness of early registration, the great American habit of "putting things off" gets in the way of doing-it-now.

Those invitees who do take advantage of advance registration make it pretty easy on themselves. They don't have to wait in long lines at the registration centers on opening day at the Metal Show. They get their badges and entry papers by return mail and sail right on into the Show with a minimum of time lost.

This is by way of a supplementary appeal to all invitees—and a casual hint to exhibitors who issued invitations to get on the ball and push for early registration. Its sems odd that this should be necessary, but apparently it is. Somewhat like the folks who inevitably jam up for auto licenses on the last day. Or like income tax payers shoving back the dismal task of figuring out what they owe Uncle Sam. At any rate—the more people who get their advance registrations in and done with, the fewer we will have stacked up and grumbling on opening day.

Interesting sidelights on the kind and caliber of advance registrants who have completed this easy chore this year indicate the 1952 Show will play to a favored audience of executives and key men. That's fine—as are the production folks who show up in the early registration tabulations and the designers, engineers and others who have the do-it-now habit.

There is more to this move to get the registrations in early this year than meets the eye. There is every indication that the Metal Show will play to the biggest audience ever this Fall. Some veteran observers guess at something more than 50,000 visitors; you can get a lot of guesses from a lot of folks but they all seem pretty sure of one thing—that more metals industries people will come to Philadelphia than any previous Show.

Exhibitors have cooperated handsomely in furnishing lists of 100 or more prospects and customers. These names have been added to the growing list of people getting all the Metal Show promotional material and the print orders are growing steadily. This is a healthy condition and one that will bear watching over the years, for it is an added service by the American Society for Metals and its prime purpose is getting more prospective customers onto the grounds during this important national event.

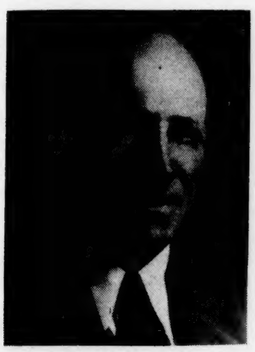
You A.S.M. members who feel the urge to help in this "very important persons" listing can jot down a few names and fire them into headquarters and these key industrial men you list will start receiving Show promotion pieces pronto. It could be that the long-range result of the spreading promotional efforts will eventually pay off big in the long-awaited recognition of metallurgists as really important folks, but we will need your help. It's a big job and worth a lot more than the few minutes it would take you to supply us with VIP names and addresses. C.S.

## A.I.M.E. To Feature Titanium Symposium At Annual Meeting

The Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers will feature an all-day symposium on "Titanium and Titanium Alloys" as a part of their technical program at the National Metal Congress and Exposition in October.

The symposium to be held in two separate sessions on Tuesday, Oct. 21, is under the chairmanship of M. A. Hunter, dean, Rensselaer Polytechnic Institute. Papers will be read by world-reknown experts in the field of titanium.

The morning session, from 9 a.m. to 12 p.m. will include lectures on "Early History of Titanium", "Developments Leading to Present Technology", "Significance of Titanium in Airframe Construction", "Titanium as an Ordnance Material", "Titanium as a Naval Material", "Electrolytic Preparation of Titanium", and



*M. A. Hunter*

"New Processes for Reduction of Titanium".

The afternoon session, from 2 p.m. to 5 p.m. will cover "Dimensional Fabrication of Titanium Without Melting", "Currently Available Alloys, Forgings and Bars", and "Sheet and Strip." The complete program is given on p. 13.

The Research in Progress sessions, inaugurated in 1950 to bring to light research not far enough advanced to establish final results, have been received with such great interest that they are being continued.

Headquarters of the I.M.D. during the Metal Show will be in the Adelphia Hotel, and all technical sessions will be held there. Registration desks will be open on Sunday, Oct. 19 from 3 to 9 p.m., on Monday and Tuesday from 8 a.m. to 5 p.m., and on Wednesday from 8 a.m. to 4 p.m. A.I.M.E. members registration fee is $2, nonmembers $4. There will be no admission charged A.I.M.E. student associates, but other students will be charged $1. Reprints of most of the papers will be presented to registrants.

The annual I.M.D. Fall Dinner will be held at 7 p.m. on Tuesday, Oct. 21, in the Crystal Room of the Adelphia Hotel. The Philadelphia Section of the Institute will provide a complimentary cocktail party for all dinner guests in the Jefferson Room immediately preceding the dinner.

Ernest O. Kirkendall is secretary of the Institute of Metals Division, with headquarters at the American Institute of Mining and Metallurgical Engineers, 29 West 39th St., New

## Cyril Smith Will Present Campbell Lecture at A.S.M. Annual Meeting

An annual event on the program of the National Metal Congress that traditionally draws an attendance numbering up to a thousand or better is the Edward deMille Campbell Memorial Lecture of the American Society for Metals. One of the country's eminent scientists and physical metallurgists has been selected to deliver this year's Campbell Lecture—namely, Cyril Stanley Smith, director of the Institute for the Study of Metals at the University of Chicago.

*C. S. Smith*

Coming to this country from England in 1924, Cyril Smith took his doctorate at Massachusetts Institute of Technology, and then spent many years as head of the research department of the American Brass Co., establishing a reputation for erudite papers in the field of constitution and transformation of metallic alloys.

The first explosion of the atomic bomb presented a new challenge, and from 1943 to 1946 Dr. Smith was associate division leader in charge of metallurgy at Los Alamos. He has been selected to receive the Francis J. Clamer Medal of the Franklin Institute for his metallurgical contribution to the development of atomic energy during and since World War II in October at the Institute in Philadelphia.

When the Institute for the Study of Metals was founded in 1946 at the University of Chicago, he accepted the directorship and has been there ever since. He is a past chairman of the Institute of Metals Division of the A.I.M.E.

The Campbell Lecture will be presented in the ballroom of the Benjamin Franklin Hotel in Philadelphia immediately following the annual meeting of the American Society for Metals.

## Metal Failures Symposium Is Scheduled in India

A symposium on "Industrial Failure of Engineering Metals and Alloys" will be held in the near future at the National Metallurgical Laboratory, Jamshedpur, India.

The symposium will be broadly divided into two main parts,(1) theoretical aspect of industrial failures of engineering metals and alloys, and (2) a study of actual service failures including a probe into their causes and possible remedial measures. Technical papers on the subjects are welcome. Those wishing to present papers should forward an advance copy to G. P. Contractor, Director, National Metallurgical Laboratory, Jamshedpur 7, India, before Oct. 31, 1952. The National Metallurgical Laboratory extends an invitation to all members of A.S.M. to participate in this symposium.

## 7th Metallographic Exhibit Scheduled for Metal Show

The seventh Metallographic Exhibit of the American Society for Metals will be held at the National Metal Congress and Exposition in Philadelphia, Pa., during the week of Oct. 20. A large area within the Philadelphia Convention Halls, scene of the "Metal Show", has been reserved so that displays of the Metallographic Exhibit can be shown to best advantage.

Ten classifications of micros are designated for the contest as listed on page 17.

There will also be a competition for undergraduate students at the 1952 Metallographic Exhibit in Philadelphia. First price is a bronze medal and $25 cash; honorable mention, a ribbon and $10 cash.

A committee of judges, appointed by the Metal Congress management, will award a first prize (blue ribbon) to the best entry in each classification. Honorable mention will be awarded to those closely approaching these winners.

A Grand Prize (engrossed certificate and $100 cash) will be presented to the exhibitor whose entry is adjudged best in the show.

## THIRTY YEARS AGO

The September 1922 issue of *Transactions* announced the establishment of the Henry Marion Howe Medal of the American Society for Steel Treating. Rules governing the award of the medal were announced at the annual convention held in Detroit in October of that year.

— 30 —

A feature of the annual convention was the unveiling of a bronze tablet memorializing those pioneers of the steel industry who in 1864 at Wyandotte, Mich., erected the first bessemer steel converter used commercially in America. The tablet was placed in front of the Wyandotte Public Library, original site of the Wyandotte Iron Works.

— 30 —

Two special symposiums were held during the 1922 convention—one on Metallurgical Education under the chairmanship of STEPHEN L. GOODALE, professor of metallurgical engineering, University of Pittsburgh, and another on Hardness Testing, in charge of Major A. E. BELLIS,† president of Bellis Heat Treating Co.

— 30 —

Toastmaster at the annual banquet was C. F. KETTERING of the Dayton Engineering Laboratories Co. (now famed General Motors research pioneer and A.S.M honorary member).

† Deceased.

### REGISTRATION CHARGES for TECHNICAL SESSIONS

**Institute of Metals Division AIME**

AISME members: $2.00
non-members: $4.00
student members AIME: No charge
student non-members: $1.00

**Society for Non-Destructive Testing**

SNT members: No charge
non-members: $3.00

**American Welding Society**

AWS members: $1.00
non-members: $2.00

**American Society for Metals**

ASM members and guests: No charge

### ADMISSION TO METAL EXPOSITION

Badges or membership cards for the four cooperating societies listed above will admit members and guests to the Exposition at no charge.

Visitors with Metal Show invitations or with registration cards properly filled out will be issued a badge at no charge. All others will be charged a registration fee of $1.

# First A.S.M. Teaching Awards To Three College Professors

The three A.S.M. Awards for Teaching of Metallurgy of $2000 each will be presented to A. A. Burr, Rensselaer Polytechnic Institute, J. W. Spretnak, Ohio State University, and R. D. Stout, Lehigh University. The awards will be made at the Annual Meeting of the Society on Wednesday morning, Oct. 22, at the Benjamin Franklin Hotel in Philadelphia.

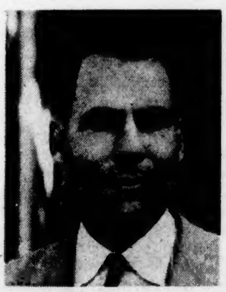
Established in 1952 by action of the Board of Trustees of the American Society for Metals, the purpose of the $2000 awards for teachers of metallurgy is to recognize the young teacher by encouraging his ability and accomplishments, and, additionally, as a result of his wider acceptance and prestige, to attract more graduates to the teaching of metallurgy, and a greater enrollment of students in departments of metallurgy. By following through with these purposes it is hoped that the need for engineers in American industries will be more nearly satisfied.

The candidates for the awards must be under 40 years of age. They must have sound knowledge of and enthusiasm for their subject and must have demonstrated their ability to impart that knowledge and enthusiasm to their students.

### Arthur A. Burr

Arthur A. Burr, associate professor of metallurgical engineering at Rensselaer Polytechnic Institute, was born in Canada in 1913. He received his B. S. degree in 1938 from the University of Saskatchewan, his M.S. degree in 1940, and his Ph.D. degree in 1943 from Pennsylvania State College. He held an arts and science scholarship at Penn State. Besides his teaching activities, Dr. Burr is in charge of the spectrographic analysis laboratory, the electron microscope, and the vacuum fusion analysis equipment at Rensselaer.

According to the comments made by various of Dr. Burr's associates and former students, he seems to have the remarkable ability to sense the position of his students and to lead them from where they are up to the level of competence which he has set as a goal for the course. The fact that he is well liked by undergraduates, in spite of the fact that he is teaching the more rigorous mathematical courses, is a strong indication of his ability to organize and present a course. He sets high standards of performance for both himself and his students, and is able to extract a high quality of work from the students while retaining both their respect and friendship.



*A. A. Burr*

### Joseph W. Spretnak

Joseph W. Spretnak, associate professor of metallurgy at Ohio State University is 36 years of age. He received his B.S. degree in 1938 from O.S.U., his M.S. degree in 1940 from Case Institute of Technology, where he was a graduate assistant in the department of metallurgy, and his Ph.D. degree from the University of Pittsburgh in 1948. From 1940-43 he was a research metallurgist with National Malleable and Steel Castings Co., from 1943-48 he was a member of the metals research laboratory staff at Carnegie Institute, and during 1944-45 he lectured on ordnance metallurgy in a graduate training program for naval officers.

*J. W. Spretnak*

Dr. Spretnak received the Henry Marion Howe Medal of the A.S.M. in 1948, and the 1940 A.I.M.E. Graduate Student Paper Prize. He is a past-chairman of the Columbus Chapter A.S.M., a member of A.S.M.'s Publication Committee, and a member of A.I.M.E.'s National Student Relations Committee.

Comments gathered about Dr. Spretnak demonstrate that he has been most active in the training of graduate students and in expanding the fields of graduate research in the department of metallurgy.

Dr. Spretnak voluntarily has offered and is offering courses and lectures in metallurgy at the O.S.U. Graduate Center, Wright-Patterson Air Force Base, Dayton, and at the Twilight School at O.S.U. His lectures are models of clarity and logical organization. He has been helpful to students beyond the requirements of his position. He is a man who wants to teach, likes to teach, and can teach. His remarkable ability to keep abreast of the latest metallurgical developments and research, and his ability to incorporate this current information into his courses and advisory council, insure that his students will be well prepared to assume the responsibilities of industry.

### Robert D. Stout

Robert D. Stout, professor of metallurgy at Lehigh University, graduated at the top of a class of 800 at Pennsylvania State College in 1935. He received his M.S. degree (1941) and his Ph.D. degree (1944) from Lehigh. He is 37 years of age.

Dr. Stout was a research assistant at Carpenter Steel Co. from 1935-39, and since 1939 he has been at Lehigh. He has been chairman of the Lehigh Valley Chapter A.S.M. twice, and chairman, university research committee, Welding Research Council.

He is the author of 30 papers on toolsteels, mechanical testing, and welding metallurgy, and the co-author of a monograph "The Weldability of Steel". In 1943 Dr. Stout was the co-recipient of the Lincoln Gold Medal for the outstanding paper on welding in the *Welding Journal.*

At Lehigh, Dr. Stout has developed and is in charge of junior and senior courses in ferrous metallurgy, and an instructor of graduate courses in welding physical chemistry of metals, and alloy steels.

It is evident from Dr. Stout's metallurgical teaching record that he has an extremely clear and penetrating mind. This mental endowment is coupled with a great love of science so study and research are a joy to him, and teaching is sharing that pleasure with others.

*R. D. Stout*

# American Society for Metals

***Technical Program***
***National Metal Congress***
***Philadelphia—Oct. 20-24, 1952***

## Monday, Oct. 20

*9:30 a. m.—Ballroom*

Benjamin Franklin Hotel

CREEP-RUPTURE AND RECRYSTALLIZATION

**Creep-Rupture and Recrystallization of Monel from 700-1700° F.,** by N. J. Grant, Associate Professor, and A. G. Bucklin, Dept. of Metallurgy, Massachusetts Institute of Technology.

**Influence of Grain Size on High-Temperature Properties of Monel,** by Paul Shahinian and J. R. Lane, Metallurgical Division, Naval Research Laboratory.

**Creep and Rupture of Chromium-Nickel Austenitic Stainless Steels,** by E. J. Dulis, G. V. Smith and E. G. Houston, Research Laboratory, United States Steel Co.

**Recrystallization and Grain Growth in Alpha Brass,** by S. L. Channon, Kaiser Aluminum and Chemical Corp., and H. L. Walker, Head, Dept. of Mining and Metallurgical Engineering, University of Illinois.

*2:00 p. m.—Ballroom*

Convention Hall

HIGH-TEMPERATURE PHASES

**Microconstituents in High-Temperature Alloys,** by H. J. Beattie, Jr. Physicist, and F. L. VerSnyder, Metallurgist, General Electric Co., Thomson Laboratory.

**Sigma Formation and Its Effect on the Impact Properties of Iron-Nickel-Chromium Alloys,** by A. M. Talbot and D. E. Furman, Research Laboratory, International Nickel Co., Inc.

**Mechanism of the Carburization of Some Stainless Steels,** by J. B. Giacobbe, Metallurgist, Superior Tube Co.

**The Electrolytic Separation and Some Properties of Austenite and Sigma in 18-8-3-1 Chromium-Nickel-Molybdenum-Titanium Steel,** by T. P. Hoar, Dept. of Metallurgy, University of Cambridge, England, and K. W. J. Bowen, Research Dept., Imperial Chemical Industries, Birmingham, England.

## Tuesday, Oct. 21

*9:30 a. m.—Ballroom*

Benjamin Franklin Hotel

PHASE TRANSFORMATION

**The Effect of Composition on the Temperature of Spontaneous Transformation of Austenite to Martensite in 18-8 Type Stainless Steel,** by G. H. Eichelman, Metallurgist, American Brass Co., and F. C. Hull, Manager, Metallurgical Section, Westinghouse Electric Corp.

**The Effect of Silicon on the Tempering of Martensite,** by A. G. Allten and P. Payson, Assistant Director of Research, Crucible Steel Co. of America.

**The Mechanism and Kinetics of the First Stage of Tempering,** by C. S. Roberts, Metallurgical Laboratories, Dow Chemical Co., B. L. Averbach, Assistant Professor, and M. Cohen, Professor of Physical Metallurgy, Massachusetts Institute of Technology.

**The Order-Disorder Transformation Viewed as a Classical Phase Change,** by F. N. Rhines, Professor of Metallurgy, and J. B. Newkirk, Carnegie Institute of Technology.

*2:00 p. m.—Ballroom*

Convention Hall

HARDENABILITY

**An End-Quench Test for Determining the Hardenability of Carburized Steels,** by F. X. Kayser, Research Metallurgist, R. F. Thomson, Head, Metallurgy Dept., and A. L. Boegehold, Assistant to General Manager, Research Laboratories Div., General Motors Corp.

**The Influence of Boron on Case Hardenability in Alloy Carburizing Steels,** by C. F. Jatczak, Research Metallurgist, and E. S. Rowland, Chief Metallurgical Engineer, Timken Roller Bearing Co.

**Effect of Carbon Content on 18-4-1 High Speed Steel,** by A. H. Grobe, Research Metallurgist, and G. A. Roberts, Chief Metallurgist, Vanadium Steel Co.

**Correlation of Machinability With Inclusion Characteristics in Resulphurized Bessemer Steels,** by L. H. VanVlack, Process Metallurgist, United States Steel Co.

## Wednesday, Oct. 22

*9:00 a. m.—Ballroom*

Benjamin Franklin Hotel

ASM ANNUAL MEETING

*10:30 a. m.—Ballroom*

Benjamin Franklin Hotel

MICROSTRUCTURE

Edward DeMille Campbell Memorial Lecture by Dr. Cyril Stanley Smith, Director, Institute for the Study of Metals, Chicago

*2:00 p. m.—Ballroom*

Convention Hall

RESEARCH

**A Study of the Mechanism of the Delayed Yield Phenomenon,** by T. Vreeland, Jr., D. S. Wood and D. S. Clark, Dept. of Mechanical Engineering, California Institute of Technology.

**The Effect of Temperature on the Rolling Texture of Plastically Deformed Low-Carbon Steel Strip,** by Norman P. Goss, Consultant, Cold Metal Products Co.

**Determination of Oxygen in Metals and Metal Oxides by the Isotopic Method,** by A. D. Kirshenbaum and A. V. Grosse, Research Institute of Temple University.

**The Indium-Arsenic System,** by T. S. Liu, Horizons, Inc., and E. A. Peretti, Acting Head, Dept. of Metallurgy, University of Notre Dame.

## Thursday, Oct. 23

*9:30 a. m.—Ballroom*

Convention Hall

MECHANICAL PROPERTIES

**The Effect of Quenching and Tempering on Residual Stresses in Manganese Oil-Hardening Tool Steel,** by H. J. Snyder, Research Associate, Mellon Institute of Industrial Research.

**X-Ray Measurement of Residual Stress in Hardened High Carbon Steel,** by A. L. Christenson, Research Metallurgist, and E. S. Rowland, Chief Metallurgical Engineer, Timken Roller Bearing Co.

**The Endurance Limit of Temper Brittle Steel,** by R. D. Chapman, Research Metallurgist, and W. E. Jominy, Chief Metallurgist, Research, Chrysler Corp.

**Plastic Stress-Strain Relations of Alcoa 14S-T6 for Variable Biaxial Stress Ratios,** by Joseph Marin, Professor of Engineering Mechanics, L. W. Hu and J. F. Hamburg, Dept. of Engineering Mechanics, Pennsylvania State College.

*2:00 p. m.—Ballroom*

Convention Hall

TEMPER BRITTLENESS

**The Effect of Various Heat Treating Cycles Upon Temper Brittleness,** by L. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory, and F. L. Carr, National Research Corp.

**Effect of Hardness on the Level of the Impact Energy Curve for Temper Brittle and Unembrittled Steel,** by F. L. Carr, National Research Corp., M. Goldman, Battelle Memorial Institute, L. D. Jaffe and D. C. Buffum, Watertown Arsenal Laboratory.

**Transverse Mechanical Properties in an S.A.E. 1045 Forging Steel,** by A. H. Grobe, Research Metallurgist, Vanadium Alloys Steel Co., Cyril Wells, Member of Staff, and R. F. Mehl, Director, Metals Research Laboratory, Carnegie Institute of Technology.

## AMERICAN SOCIETY FOR METALS *(Continued)*

**The Determination of the Elastic Constants of Metals by the Ultrasonic Pulse Technique,** by M. B. Reynolds, Knolls Atomic Power Laboratory, General Electric Co.

### Friday, Oct. 24

*9:30 a. m.—Ballroom*

Convention Hall

ELEVATED TEMPERATURE PROPERTIES

**Temperature Dependence of the Hardness of Pure Metals,** by J. W. Westbrook, The Knolls, Research Laboratory, General Electric Co.

**Hardness of Various Steels at Elevated Temperatures,** by F. Garofalo, P. R. Malenock and G. V. Smith, Research Laboratory, United States Steel Co.

**Some Properties of a Nodular Iron at Elevated Temperatures,** by M. S. Saunders, Graduate Student, and M. J. Sinnott, Associate Professor of Chemical and Metallurgical Engineering, University of Michigan.

**Accelerated Strain Aging of Commercial Sheet Steels,** by L. R. Schoenberger and E. J. Paliwoda, Research Engineer, Jones and Laughlin Steel Corp.

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## SEMINAR ON MODERN RESEARCH TECHNIQUES IN PHYSICAL METALLURGY

(All sessions will be held in the Ballroom of the Benjamin Franklin Hotel)

### Saturday, Oct. 18

*9:30 a. m.*

METALLOGRAPHIC METHODS

**Optical Microscopy,** by George L. Kehl, Columbia University.

**Electron Microscopy and Diffraction,** by Robert D. Heidenreich, Bell Telephone Laboratories.

**Crystal Growth and Crystal Boundary Techniques,** by Bruce Chalmers, University of Toronto.

*2:00 p. m.*

DIFFRACTION METHODS

**X-Ray Diffraction Techniques,** by Charles S. Barrett, University of Chicago.

**Diffuse Scattering of X-Rays,** by B. E. Warren and B. L. Averbach, Massachusetts Institute of Technology.

**Pole Figure Determinations,** by A. H. Geisler, General Electric Co.

**Techniques and Applications of Neutron Diffraction,** by C. G. Shull, Oak Ridge National Laboratory.

*8:00 p. m.*

DEMONSTRATION LECTURE

**Electron Emission Studies of Metallurgical Problems,** by Erwin W. Muller, Pennsylvania State College.

### Sunday, Oct. 19

*9:30 a. m.*

MECHANICAL METHODS

**Deformation of Single Crystals,** by Earl R. Parker and Jack Washburn, University of California.

**High-Speed Strain Measurements,** by George R. Irwin, Naval Research Laboratory.

**Internal Friction,** by Charles A. Wert, University of Illinois.

*2:00 p. m.*

FERROMAGNETIC AND RADIOACTIVE METHODS

**Ferromagnetic Domains,** by H. J. Williams, Bell Telephone Laboratories.

**Radioactive Tracers,** by M. B. Bever, Massachusetts Institute of Technology.

**Radioaction Damage as a Research Technique,** by Sidney Siegel, North American Aviation, Inc.

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## THREE A.S.M. LECTURE COURSES

(All sessions will be held in the Ballroom of the Convention Hall)

BEHAVIOR OF METALS AT LOW TEMPERATURES

### Monday, Oct. 20

*4:30 p. m.*

**Behavior of Single Crystals and Pure Metals,** by R. M. Brick, Department of Metallurgy, University of Pennsylvania.

*8:00 p. m.*

**Influence of Mechanical Variables,** by J. R. Low, Jr., Knolls Atomic Power Laboratory, General Electric Co.

**Influence of Metallurgical Factors,** by C. H. Lorig, Assistant Director, Battelle Memorial Institute.

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GASES IN METALS

### Tuesday, Oct. 21

*4:30 p. m.*

**Fundamental Metallurgical and Thermodynamic Principles of Gas-Metal Behavior,** by D. P. Smith, Professor Emeritus, Princeton University.

**Gases in Nonferrous Metals and Alloys,** by L. W. Eastwood, Assistant Director of Research, Kaiser Aluminum Co.

### Wednesday, Oct. 22

*4:30 p. m.*

**The Behavior of Gases in Liquid Iron and Steel,** by D. J. Carney, Chief Development Metallurgist, United States Steel Co.

**The Behavior of Gases in Solid Iron and Steel,** by C. E. Sims, Assistant Director, Battelle Memorial Institute.

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METALLURGICAL TOOLS FOR ALLOY CONSERVATION AND INCREASED PRODUCTION

All lectures by J. Alfred Berger, University of Pittsburgh

### Tuesday, Oct. 21

*8:00 p. m.*

**Significance of Chemical Analyses in Alloy Classification and Mechanical Properties.**

**Progress in Spectrography and X-Ray Diffraction Analyses and Techniques.**

### Wednesday, Oct. 22

*8:00 p. m.*

**The Effects of Alloy Substitution on the Fundamentals of Hardening Metals.**

**Boron and Rare Earths in Alloy Conservation and Production.**

# Society for Non-Destructive Testing

***Hotel Sylvania***
***Philadelphia***
***Oct. 20-23, 1952***

## Monday, Oct. 20

*9:00 a. m.*

PRESIDENT'S ADDRESS

*10:00 a. m.*

LOWERING PRODUCTION COSTS WITH MODERN X-RAY EQUIPMENT

**The General Electric Industrial Betatron,** by T. W. Dietze, General Electric Co.

**Modern Techniques in Precision High-Voltage Radiography,** by E. Alfred Burrill, High-Voltage Engineering Corp.

**Uses of Low-Voltage X-Ray Tubes With Thin Beryllium Windows in Nondestructive Testing,** by Tom H. Rogers, Machlett Laboratories.

**The Current Status of the Picker-Polaroid Process for One-Minute Radiography in the Industrial Field,** by W. B. Pyle, Picker X-Ray Corp.

Alternate: **Direct Exposure Enlargement Techniques in Radiography and Fluoroscopy Utilizing Fractional-Focus X-Ray Tubes,** by Leo C. Kotraschek, North American Philips Co. Inc.

*2:00 p. m.*

NEW TECHNIQUES FOR APPLYING X-RAY NONDESTRUCTIVE TESTS

**Reduction of Exposure Time in Gamma Radiography,** by J. J. Hirschfield and D. T. O'Connor, Naval Ordnance Laboratory.

**Techniques Used in Measuring Uniformity of Materials by Means of Gamma Radiation,** by Lawrence R. Megill and John N. Harris, Los Alamos Scientific Laboratories.

**Some Industrial Applications of Microradiography,** by S. Goldspiel and F. Bernstein, New York Naval Shipyards.

**Gaging Tin Coatings in the Steel Industry by X-Ray Fluorescence Analysis,** by Frederick A. Behr, North American Philips Co., Inc.

Alternate: **Application of Fluorescence X-Rays to Metallurgical Microradiography,** by Herman E. Seeman and H. R. Splettstosser, Eastman Kodak Co.

Alternate: **Iridium-192 in Industrial Radiography,** by James V. Rigbey and C. F. Baxter, Ford Motor Co. of Canada.

## Tuesday, Oct. 21

*9:00 a. m.*

CONTROL AND INTERPRETATION IN X-RAY TESTING

**Film Characteristics as Applied to Radiation Monitoring,** by George Corney, Eastman Kodak Co.

**Problems of Mechanical Film Development,** by Donald F. Hauptman and Gerold H. Tenney, Los Alomas, N. M.

**Various Penetrameter Types and Their Limitations,** by Norman C. Miller and Gerold H. Tenney, Los Alamos, N. M.

**Interpretation of Radiographs of Aluminum and Magnesium Castings,** by J. J. Pierce, Naval Ordnance Laboratory.

Alternate: **Semi-Empirical Equation for the Spectral Energy Distribution in X-Ray Beams,** by Charles R. Emigh, Los Alamos, N. M.

*2:00 p. m.*

THE ECONOMICS OF NONDESTRUCTIVE TESTING TO LOWER PRODUCTION COSTS

**Economic Factors in Nondestructive Testing,** by W. E. Thomas, Vice-President, Magnaflux Corp.

**Quality Control Applications of Nondestructive Tests in the Airframe Industries Which Will Effectively Lower Production Costs,** by B. W. Clawson, Quality Manager, Douglas Aircraft, Inc.

**The Use of Nondestructive Test Methods in Heavy Manufacture,** by James A. Pratt, Metallurgical Engineer, Westinghouse Electric Corp.

Alternate: **Bibliography of Nondestructive Testing,** by staff members of Battelle Memorial Institute. Columbus, Ohio.

*5:00 p. m. and 9:00 p. m.*

ANNUAL OFFICERS' RECEPTION AND SOCIAL MEETING

## Wednesday, Oct. 22

*9:00 a. m.*

NEW METHODS AND APPLICATIONS OF ULTRASONIC NONDESTRUCTIVE TESTS

**Ultrasonic Adsorption, Its Relation to Test Interpretation, and Its Correlation With Service Performance,** by Leslie W. Ball, U. S. Naval Ordnance Test Station.

**Electronic Reproduction of Ultrasonic Immersion Images,** by Donald Erdman, President, Electro Circuits, Inc.

**Ultrasonic Examinations of Weldments and the Establishment of Safe Acceptable Limits for Defects,** by Frank C. Parker, Carbide and Carbon Chemicals Co.

**Ultrasonic Equipment for High-Precision Thickness Measurements,** by Peter K. Bloch, Vice-President, Branson Instrument Co.

**Ultrasonic Testing of Cast Iron Pipe,** by G. B. Baumeister, Magnaflux Corp.

Alternate: **Geophysics—Its Relation to Nondestructive Testing,** by Peter Dehlinger and Sam Wenk, Battelle Memorial Institute.

Alternate: **Economic Industrial Applications of the Metroscope,** by Mr. Mann, Walter Kiddie and Co.

Alternate: **Future Trends in Industrial Ultrasonic Testing,** by William I. Bendz, Sperry Products, Inc.

*2:00 p. m.*

NEW ELECTROMAGNETIC NONDESTRUCTIVE TESTS

**Industrial Evaluation of Search Coil Flaw Detection Techniques,** by George A. Darcy and Carleton E. Hastings, Watertown Arsenal.

**A Metals Comparator for the Inspection and Classification of Metals,** by B. M. Smith, General Engineering Laboratory, General Electric Co.

**Industrial Applications of Eddy Current Testing,** by W. A. Cannon, Magnaflux Corp.

Alternate: **New Nondestructive Test Instruments Developed by the Institut Dr. Forster,** by Friedrich Forster, Institut Dr. Forster, Germany.

## Thursday, Oct. 23

*9:00 a. m.*

USING LIQUID-PENETRANT AND ELECTRICAL NONDESTRUCTIVE TEST METHODS

**Comparison of Materials f r Liquid-Penetrant Inspection,** by Hamilton Migel and Taber de Forest, Magnaflux Corp.

**Lowered Production Costs With Turco Dy-Chek and Turco Chek-Spek,** by Gordon Rice, Turco Products, Inc.

**The Application of Wire-Resistance Strain Gages to Lower Production Costs,** by Francis G. Tatnall, Baldwin-Lima-Hamilton Corp.

**Filtered Particle Inspection of High-Tension Insulaters,** by Henry N. Staats, Magnaflux Corp.

Alternate: **The Measurement of Ionization in Dielectric Structures—a New Nondestructive Test for Electrical Insulating Materials,** by D. A. Lupfer, General Electric Co.

*2:00 p. m.*

MEHL HONOR LECTURE AND ANNUAL BUSINESS MEETING

**Industrial Fluoroscopy,** by Donald T. O'Connor, Chief, Radiology Section, Naval Ordnance Laboratory.

# Institute of Metals Division A.I.M.E.

***Adelphia Hotel Philadelphia Oct. 20-22, 1952***

## Monday, Oct. 20

*9:00 a. m.—Crystal Room*

THERMODYNAMIC AND THERMAL PROPERTIES

**Scaling of Lead in Air,** by Elmer Weber, Chase Brass and Copper Co., and W. M. Baldwin, Jr., Case Institute of Technology.

**Concentration Dependence of Diffusion Coefficients in Metallic Solid Solutions,** by D. E. Thomas, Westinghouse Atomic Power Division, and C. E. Birchenall, Carnegie Institute of Technology.

**Thermodynamic Properties of Solid Nickel-Gold Alloys,** by L. L. Seigle, Sylvania Electric Products, Inc., M. Cohen and B. L. Averbach, Massachusetts Institute of Technology.

**Transformation in Cobalt-Nickel Alloys,** by J. B. Hess, Kaiser Aluminum and Chemical Corp., and C. S. Barrett, University of Chicago.

**Principles of Zone-Melting,** by W. G. Pfann, Bell Telephone Laboratories.

**Segregation of Two Solutes, With Particular Reference to Semiconductors,** by W. G. Pfann, Bell Telephone Laboratories.

*9:00 a. m.—Jefferson Room*

HIGH TEMPERATURE

**Some Observations of Sub Grain Formation During Creep in High-Purity Aluminum,** by I. S. Servi, Union Carbide & Carbon Corp., J. T. Norton and N. J. Grant, Massachusetts Institute of Technology.

**Observations of Creep of the Grain Boundary in High-Purity Aluminum,** by H. C. Chang and N. J. Grant, Massachusetts Institute of Technology.

**Creep Correlations in Alpha Solid Solutions of Aluminum,** by O. D. Sherby and J. E. Dorn, University of California.

**Effect of Zirconium on Magnesium-Thorium and Magnesium-Thorium-Cerium Alloys,** by T. E. Leontis, Dow Chemical Co.

**Influence of Chemical Composition on the Rupture Properties at 1200° F. of Wrought Cr-Ni-Co-Fe-Mo-W-Cb Alloys,** by E. E. Reynolds, Allegheny-Ludlum Steel Corp., and J. W. Freeman and A. E. White, University of Michigan.

**High-Temperature Oxidation of Some Iron Chromium Alloys,** by D. Caplan and M. Cohen, National Research Council, Ottawa.

**Mechanical Properties of Intermetallic Compounds at Elevated Temperatures,** by Robert Lowrie, Lewis Flight Propulsion Laboratory.

*2:00 p. m.—Crystal Room*

RESEARCH IN PROGRESS

## Tuesday, Oct. 21

*9:00 a. m.—Crystal Room*

SYMPOSIUM ON TITANIUM AND TITANIUM ALLOYS

**Early History of Titanium,** by M. A. Hunter, Rensselaer Polytechnic Institute.

**Developments Leading to Present Technology,** by J. R. Long, Minerals and Metals Advisory Borad.

**Significance of Titanium in Air Frame Construction,** by J. S. Dick, Air Force Material Command.

**Titanium as an Ordnance Material,** by B. S. Mesick, Ordnance Corps, Watertown Arsenal.

**Titanium as a Naval Material,** by E. L. Beardman, Office of Naval Materials.

**New Processes for Reduction of Titanium,** by R. S. Dean, Consulting Engineer.

**Dimensional Fabrication of Titanium Without Melting,** by G. S. Davies, Brush Development Co.

*9:00 a. m.—Jefferson Room*

DEFORMATION

**Dynamic Formation of Slip Bands in Aluminum,** by N. K. Chen and R. B. Pond, Johns Hopkins University.

**Observations on the Tension Texture of Aluminum,** by E. A. Calnan and Betty E. Williams, National Physical Laboratory.

**Deformation of Zinc Bicrystals by Thermal Ratcheting,** by J. E. Burke and Anna M. Turkalo, General Electric Co.

**Surface Effects in the Slip and Twinning of Metal Monocrystals,** by J. J. Gilman and T. A. Read, Columbia University.

**Kinking in Zinc Single Crystal Tension Specimens,** by Jack Washburn and E. R. Parker, University of California.

*2:00 p. m.—Crystal Room*

SYMPOSIUM ON TITANIUM AND TITANIUM ALLOYS (Continued)

**Currently Available Alloys, Forgings and Bars,** by L. R. Frazier, General Electric Co.

**Sheet and Strip,** by A. W. Sweet, Boeing Airplane Co.

**Recent Metallurgical Developments,** by Thomas Lippert, Titanium Metals Corp. of America, W. L. Finlay, Rem-Cru Titanium, Inc., F. H. Vandenburgh, Mallory Sharon Titanium, B. H. Whitmer, Republic Steel Corp., and E. H. Gee, E. I. duPont de Nemours & Co., Inc.

*2:00 p. m.—Jefferson Room*

PHYSICAL METALLURGY

**Development of Mechanical and Magnetic Hardness in a 10% Vanadium-Cobalt-Iron Alloy,** by R. W. Fountain, Union Carbide & Carbon Corp., and J. F. Libsch, Lehigh University.

**Observations on Nodular Graphite,** by H. M. Weld, R. L. Cunningham and F. W. C. Boswell, Department of Mines and Technical Surveys.

**Strain Patterns in Charpy Impact Specimens of 0.20 Percent Carbon Mild Steel,** by R. S. Bumps, Studebaker Corp.

**Recrystallization Kinetics of Low-Carbon Steel,** by S. F. Reiter, General Electric Co.

**Effect of Molybdenum and of Nickel on the Rate of Nucleation and the Rate of Growth of Pearite,** by R. W. Parcel, Rem-Cru Titanium, Inc., and R. F. Mehl, Carnegie Institute of Technology.

**Effect of Applied Stress on the Martensitic Transformation,** by S. A. Kulin, Westinghouse Atomic Power Division, and M. Cohen and B. L. Averbach, Massachusetts Institute of Technology.

**A Study of Grain Shape in an Aluminum Alloy and Other Applications of Stereoscopic Microradiography,** by W. M. Williams, Revere Copper and Brass Co., and C. S. Smith, University of Chicago.

*7:00 p. m. Crystal Room*

ANNUAL DINNER

## Wednesday, Oct. 22

*2:00 p. m.—Crystal Room*

TITANIUM

**Titanium-Chromium Phase Diagram,** by F. B. Cuff, N. J. Grant and C. F. Floe, Massachusetts Institute of Technolgy.

**Titanium-Copper Binary Phase Diagram,** by A. Joukainen, E. I. duPont de Nemours & Co., Inc., and N. J. Grant and C. F. Floe, Massachusetts Institute of Technology.

**Titanium-Aluminum System,** by E. S. Bumps, H. D. Kessler and M. Hansen, Armour Research Foundation of Illinois Institute of Technology.

**Observations on the Lattice Parameters of the Alpha and TiO Phases in the Titanium-Oxygen System,** by W. Rostoker, Armour Research Foundation of Illinois Institute of Technology.

**Nature of the Line Markings in Titanium and Alpha Titanium Alloys,** by C. M. Craighead, G. A. Lenning and R. I. Jaffee, Battelle Memorial Institute.

**Time - Temperature - Transformation Characteristics of Titanium-Molybdenum Alloys,** by D. J. DeLazaro, M. Hansen, R. E. Riley and W. Rostoker, Armour Research Foundation of Illinois Institute of Technology.

**Compression Texture of Iodide Titanium,** by D. N. Williams and D. S. Eppelsheimer, Missouri School of Mines and Metallurgy.

**Partial Titanium-Vanadium Phase Diagram,** by Paul Pietrokowsky and Pol Duwez, California Institute of Technology.

*2:00 p. m.—Jefferson Room*

CONSTITUTIONAL DIAGRAMS

**Tungsten-Cobalt-Carbon System,** by Pekka Rautala and J. T. Norton, Massachusetts Institute of Technology.

**Role of the Binder Phase in Cemented Tungsten Carbide-Cobalt Alloys,** by Joseph Gurland, Firth Sterling Steel & Carbide Corp., and J. T. Norton Massachusetts Institute of Technology.

**Solubility of Carbon and Oxygen in Molybdenum,** by W. E. Few and G. K. Manning, Battelle Memorial Institute.

**A Thermal and Dilatometric Investigation of the Alloys of Cobalt With Chromium and Molybdenum,** by A. G. Metcalfe, Deloro Smelting and Refining Co.

**System Molybdenum-Boron and Some Properties of the Molybdenum Borides,** by Robert Steinitz, Ira Binder and David Moskowitz, American Electro Metal Corp.

**Systems Zirconium-Molybdenum and Zirconium-Wolfram,** by R. F. Domagala, D. J. McPherson and M. Hansen, Armour Research Foundation of Illinois Institute of Technology.

**Copper-Zinc Constitution Diagram Redetermined in the Vicinity of the Beta Phase by Means of Quantitative Metallography,** by Lilian Beck and C. S. Smith, University of Chicago.

**Intermediate Phases in the Mo-Fe-Co, Mo-Fe-Ni, and Mo-Ni-Co Ternary Systems,** by D. K. Das, Notre Dame University, S. P. Rideout, E. I. duPont de Nemours Argonne National Laboratory, and P. A. Beck, University of Illinois.

COMMITTEE MEETINGS

(Institute of Metals Division)

**Sunday, Oct. 19—8:00** p.m., Junior Room, Program Committee.

**Monday, Oct. 20—4:30** p.m., Junior Room, Membership Committee.

**Monday, Oct. 20—6:30** p.m., Coral Room, Executive Committee Dinner Meeting.

**Tuesday, Oct. 21—4:30** p.m., Junior Room, Publications Committee.

**Wednesday, Oct. 22—12:15** p m., Coral Room, Powder Metallurgy Committee Luncheon Meeting.

# American Welding Society

***33rd National Fall Meeting***
***Hotel Bellevue-Stratford***
***Philadelphia, Oct. 20-24, 1952***

## Monday, Oct. 20

*10:00 a. m.—Rose Garden*

AWARDING OF PRIZES

*10:30 a. m.—Rose Garden*

ADAMS LECTURE

**The Welding and Brazing of Titanium Alloys,** by C. B. Voldrich, Battelle Memorial Institute.

*2:00 p. m.*

(Three Simultaneous Sessions)

FABRICATING PROCEDURES

Rose Garden

**Fusion Welding Techniques for Jet Aircraft Components,** by Arnold S. Rose and Morton A. Braun, I.T.E. Circuit Breaker Co.

**Should Preheat Be Substituted for High-Temperature Stress Relief in the Codes?,** by E. Paul DeGarmo, University of California.

**Chromium-Recovery During Submerged-Arc Welding,** by James G. Kerr and David A. Elmer, C. F. Braun & Co.

RESISTANCE WELDING

North Garden

**Corrosion of Structural Spot Welds,** by B. Karnisky, E. P. Gruca and E. Kinelski, Pullman-Standard Car Manufacturing Co.

**Maintenance of Resistance Welders in High-Speed Assembly Lines,** by James F. Salatin and O. D. Etchison, Delco-Remy Div., General Motors Corp.

HARD FACING AND FLAME HARDENING

South Garden

**Hard-Facing Alloys of the Chromium Carbide Type,** by Howard S. Avery and Henry J. Chapin, American Brake Shoe Co.

**Selection and Evaluation of Methods of Hard Facing,** by Jack J. Barry, Air Reduction Sales Co.

**Flame Hardening of Large-Diameter, Thin-Wall Cylindrical Shells,** by G. S. Wing and G. A. Weber, M. W. Kellogg Co.

*6:00 p. m.—Burgundy Room*

PRESIDENT'S RECEPTION

## Tuesday, Oct. 21

*9:30 a. m.*

(Three Simultaneous Sessions)

RESISTANCE WELDING

North Garden

**The Expressions of Spotweld Properties,** by Julius Heuschkel, Westinghouse Electric Corp.

**Temperature Distribution During Flash Welding of Steel—Part II,** by Ernest F. Nippes, Warren F. Savage, John J. McCarthy and Sheridan S. Smith, Rensselaer Polytechnic Institute.

**Spot Welding of Titanium Alloy Sheet,** by M. L. Begeman, Edwin H. Block, Jr., and Frank W. McBee, Jr., University of Texas.

**Spot Welding Magnesium With Three-Phase Low-Frequency Equipment,** by Dean L. Knight and Paul Thorne, National Electric Welding Machines Co., and Paul Klain, Dow Chemical Co.

WELDABILITY

South Garden

**Further Studies of the Crack Sensitivity of Aircraft Steels,** by A. W. Steinberger and J. Stoop, Curtiss Wright Corp., Propeller Div.

**Effect of Geometry on Stresses in Circular Patch Specimen,** by Alan V. Levy and Harry E. Kennedy, University of California.

**Evaluation of the Circular-Patch Weld Test,** by John E. Hockett and L. O. Seaborn, University of California.

**Relationship of Welding Technique to Penetration and Dilution,** by Clarence E. Jackson and Arthur E. Shrubsall, Union Carbide and Carbon Research Laboratories, Inc.

STRUCTURAL

Rose Garden

**The Behavior of Welded Portal Frames,** by E. R. Johnston, Lynn S. Beedle, Fritz Engineering Laboratory, Lehigh University, and J. M. Ruzek, C. F. Braun & Co.

**Residual Stress and the Compressive Strength of Steel,** by Lynn S. Beedle, A. W. Huber, Fritz Engineering Laboratory, Lehigh University, and Bruce G. Johnston, University of Michigan.

**How to Save Cost by Designing for Structural Welding,** by Alfred E. Pearson, Ingalls Iron Works Co.

**Distortion Control in Structural Fabrication,** by Gordon Cape and Llewellyn Jehu, Dominion Bridge Co., Ltd.

*2:00 p. m.*

(Three Simultaneous Sessions)

WELDABILITY

South Garden

**The Effect of Strain Rate on Twinning and Brittle Fracture in Low-Carbon Steel,** by D. Rosenthal and C. C. Woolsey, Jr., University of California.

**Interpretation of Test Data Regarding Brittle Strength and Transition Temperature of Structural Steel,** by W. C. Hoeltje and N. M. Newmark, University of Illinois.

**Factors Affecting the Resistance of Pressure Vessel Steels to Repeated Overloading,** by Robert D. Stout, John H. Gross and Schillings Tsang, Lehigh University.

RESISTANCE WELDING

North Garden

**Quality Control of Resistance Welding by Statistical Methods,** by J. F. Radford and R. K. Waldvogel, Crosley Div., Avco Manufacturing Corp.

**Contact Resistance,** by William B. Kouwenhoven, Johns Hopkins University and Clarence W. Little, Jr., Allis-Chalmers Co.

**New Multispot Control Provides Increased Welding Production With Limited Power Supply,** by Claude R. Whitney, Jr., Square D Co.

BRAZING AND BRONZE WELDING

Rose Garden

**New Multispot Control Provides In-Brazing and Related Techniques,** by Robert Humphrey and Rene D. Wasserman, Eutectic Welding Alloys Corp.

**Strength Joints to Steel With Aluminum Bronze Filler Metals,** by Willis G. Groth, Ampco Metal, Inc.

*4:30 p. m.—Rose Garden*

EDUCATIONAL LECTURE SERIES

**The Inert-Gas Metal-Arc-Welding Process,** by Walter H. Wooding, Philadelphia Naval Shipyard.

*6:30 p. m.—Junior Room*

SECTION OFFICERS DINNER AND MEETING

## Wednesday, Oct. 22

*9:00 a. m.*

PLANT VISITS

*(Open only to citizens or visitors having necessary credentials.)*

Philadelphia Naval Shipyard, Naval Air Material Center, or Steam Division, Westinghouse Electric Corp., Lester, Pa.

*9:30 a. m.*

(Three Simultaneous Sessions)

NONFERROUS

North Garden

**The Semi-Automatic Inert-Gas Metal-Arc Welding of Aluminum Alloys,** by Charles T. Gayley, Joseph R. Girini and Walter H. Wooding, Industrial Test Laboratory, Philadelphia Naval Shipyard.

**Welding 90-10 Cupro-Nickel by the Inert-Gas-Shielded Arc Processes,** by L. H. Hawthorne, Revere Copper and Brass, Inc.

**Weld Cracking of Aluminum Alloys** by James D. Dowd, Aluminum ... of America.

WELDABILITY

Rose Garden

**Relation of Preheating to Low-Temperature Cooling Rate Embrittlement and Microcracking,** by A. E. Flanigan and T. Micleu, University of California.

**Initiation and Propagation of Brittle Fracture in Structural Steels,** by Peter P. Puzak, Earl W. Eschbacher and William S. Pellini, Naval Research Laboratory.

**The Continuous Cooling Transformation of Weld Heat-Affected Zones,** by W. R. Apblett, L. K. Poole and W. S. Pellini, Naval Research Laboratory.

**The Determination of Optimum Conditions for the Automatic Welding of Hardenable Steels,** by C. R. McKinsey and J. F. Collins, Union Carbide & Carbon Research Laboratories, Inc.

TITANIUM ALLOYS

South Garden

**Practical Aspects of Arc Welding Titanium Alloys,** by J. J. Chyle and Ivan Kutuchief, A. O. Smith Corp.

**The Effects of Fe, Mn, Cr and Mo on Welds in Titanium,** by G. E. Faulkner, G. B. Grable and C. B. Voldrich, Battelle Memorial Institute.

**An Investigation of the Thermal Cycles Adjacent to Arc Welds in ½ Inch Titanium Plate,** by E. F. Nippes, J. M. Gerken and B. W. Schaaf, Rensselaer Polytechnic Institute.

**Contaminants in Welding Titanium,** by R. W. Huber, and Thomas R. Graham, Bureau of Mines.

*2:00 p. m.*

(Three Simultaneous Sessions)

WELDABILITY

North Garden

**Embrittlement of High-Strength Ferritic Welds,** by Peter P. Puzak and William S. Pellini, Naval Research Laboratory.

**Temper Brittleness in Low Alloy Steel Weld Metal,** by Richard P. Wentworth and Hallock C. Campbell, Arcos Corp.

**The Effects of Electrodes and Welding Conditions on the Ductility of Arc-Welded Mild Steels,** by Ernest F. Nippes and Alexander Lesnewich, Rensselaer Polytechnic Institute.

NONFERROUS

South Garden

**The Strength and Ductility of Welds in Aluminum Alloy Plate,** by F. M. Howell and F. G. Nelson, Jr., Aluminum Research Labortories.

**Factors Which Determine the Performance of Aluminum Alloy Weldments,** by W. R. Apblett, C. R. Felmley and W. S. Pellini, Naval Research Laboratory.

**Welding and Forming of Titanium,** by Francis H. Stevenson, Aerojet Engineering Corp.

MAINTENANCE AND GAS CUTTING

Rose Garden

**Wear and Operation Problems in Maintenance,** by Frank J. Gaydos, United States Steel Co., Gary Works.

**Effect of Oxygen Cutting on Alloy Steel,** by F. C. Saacke, Air Reduction Co., Inc.

*4:30 p. m.—Rose Garden*

EDUCATIONAL LECTURE SERIES

**The Inert-Gas Metal-Arc Welding Process,** by Walter H. Wooding, Philadelphia Naval Shipyard.

*6:30 p. m.—Pink Room*

NATIONAL OFFICERS DINNER AND MEETING

*8:00 p. m.—South Garden*

W.R.C. UNIVERSITY RESEARCH CONFERENCE

## Thursday, Oct. 23

(Three Simultaneous Sessions)

*9:30 a. m.*

INERT ARC WELDING

North Garden

**A Comparison of Shielding Mixtures for Gas-Shielded Arc Welding,** by John W. Cunningham and Harry C. Cook, Air Reduction Sales Co.

**Production Welding of Mild and Low-Alloy Steels by Gas-Shielded Arc Welding,** by Gilbert Rothschild and John H. Berryman, Air Reduction Sales Co., Inc.

**Porosity in Mild Steel Weld Metal,** by Donald Warren, E. I. du Pont de Nemours & Co., and R. D. Stout, Lehigh University.

BRAZING

South Garden

**Advanced Information for the Brazing Operator,** by E. F. Davis, Westinghouse Electric Corp.

**Joint Design for Brazing,** by W. J. Van Natten, General Electric Co.

**Technical Aspects of Soldering Practices,** by R. M. MacIntosh, Tin Research Institute, Inc.

**Production Brazing,** by J. R. Wirt, Delco-Remy Div., General Motors Corp.

MARINE CONSTRUCTION

Rose Garden

**New Rules for Welding Low-Alloy Ferritic Pipe Material,** by Charles F. Perry, Commander, U.S.C.G.

**Evaluation of Brittle Failure Research,** by Paul Ffield and E. Sweeney, Bethlehem Steel Co.

**An Investigation on Peening,** by P. L. Calamari, F. J. Crum and G. W. Place, American Bureau of Shipping.

## AMERICAN WELDING SOCIETY *(Continued)*

*2:00 p. m.*—Clover Room
BUSINESS MEETING

*3:00 p. m.*—Junior Room
BOARD OF DIRECTORS MEETING

*7:00 p. m.*—Ball Room
ANNUAL DINNER

### Friday, Oct. 24

*9:30 a. m.*

(Three Simultaneous Sessions)

PIPE

North Garden

**Pipe Welding in the Petroleum Refining Industry,** by Albert W. Zeuthen, Socony-Vacuum Oil Co.

**The Arc Welding of Low Chromium-Molybdenum Steel Pipe,** by J. Bland, L. J. Privoznik and F. J. Winsor, Standard Oil Co. of Indiana.

**Effect of Stresses and Stress Relief on the Bursting Strength of Circumferentially Welded Cylinders,** by L. J. Privoznik, Standard Oil Co. of Indiana.

INERT ARC

South Garden

**Inert-Gas Shielding of the Metallic Arc,** by William L. Green and Robert J. Krieger, Ohio State University.

**Gas Flow Requirements for Inert-Gas Arc Shielding,** by Glenn J. Gibson, Air Reduction Co., Inc.

**Shielded Arc Welding of Jet Engine Components,** by K. H. Koopman, Linde Air Products Co.

MARINE CONSTRUCTION

Rose Garden

**Prevention of Marine Corrosion by Metallizing Systems,** by Howard Vanderpool, Metallizing Engineering Co.

**Observations on Experience With Welded Ships,** by David P. Brown, American Bureau of Shipping.

**Failures and Defects Encountered in Welded Ship Construction,** by Ralph D. Bradway, New York Shipbuilding Corp.

*Metals Section Regional Meeting*

# Special Libraries Association

*Philadelphia, Oct. 20-21, 1952*

### Monday, Oct. 20

*2:00 p. m.*

Benjamin Franklin Hotel—Franklin Room

NEW HORIZONS IN LITERATURE SEARCHING

**International Cooperation in Metallurgical Literature Classification.** Report of Interim Committee on Literature Classification, by Marjorie R. Hyslop, American Society for Metals.

**Application of Standard Business Machine Punched-Card Equipment to Metallurgical Literature References,** by Alvin T. Maierson and W. W. Howell, Battelle Memorial Institute.

**A Marginal Punched-Card System for a Specialized Information Collection,** by Milton W. Sebring, Abrasive Div., Norton Co.

**Operation of a Technical Information Center,** by Robert C. McMaster and Iver Igelsrud, Battelle Memorial Institute.

**Specialized Machines of the Future for Handling Broad Ranges of Subject Matter,** by James W. Perry, Massachusetts Institute of Technology.

### Tuesday, Oct. 21

TECHNICAL SESSION

*9:00 a. m.*

Engineers Club

**Research Reports, Their Organization and Availability,** by I. A. Warheit, Argonne National Laboratory.

**How to Obtain Unclassified Material From the Government,** by Eugene B. Jackson, National Advisory Committee for Aeronautics.

**Foreign Language Literature and the New International Journal,** by John H. Hollomon, General Electric Co.

TECHNICAL SESSION

*2:00 p. m.*

Betsy Ross Room A—Benjamin Franklin Hotel

**Foreign Language Literature in Translation,** by Frederica M. Weitlauf, Timken Roller Bearing Co.

**Technical Research Versus the Librarians,** by Iver Igelsrud, Battelle Memorial Institute.

**Selling Your Library to Management,** by M. H. Bigelow, Plaskon Co., Inc.

## *Register by Mail—*

and save time at the Registration Desk. Clip Advance Registration Form on page 24, (Metal Show Section), and mail to Registration Committee, National Metal Exposition, Philadelphia Convention Halls, Philadelphia 3, Pa.

## *For Hotel Reservations*

Write direct to George Sikorski, Housing Bureau, Philadelphia Convention and Visitors Bureau, 17th and Sansom Strs., Philadelphia 3, Pa.

# 7th metallographic exhibit

Entries are invited in the 7th Metallographic Exhibit, to be held during the National Metal Exposition in Philadelphia the week of Oct. 20 through 24, 1952. Entries will be displayed to good advantage and awards will be given for the best micrographs as decided by a competent committee of judges.

## RULES FOR ENTRANTS

Work which has appeared in previous metallographic exhibits held by the American Society for Metals is unacceptable. Photographic prints shall be mounted on stiff cardboard of maximum dimensions approximating 15 by 22 in. (14 by 18 in. for entries from outside U. S. A.). Heavy, solid frames are not permissible because of difficulties in mounting the exhibit. Entries should carry a label giving:

Name of metallographer
Classification of entry
Material, etchant, magnification
Any special information as desired

Transparencies or other items to be viewed by transmitted light must be mounted on light-tight boxes wired for plugging into lighting circuit, and built so they can be fixed to the wall.

Exhibits must be delivered between Sept. 25 and Oct. 15, 1952, either by prepaid express, registered parcel post or first class letter mail.

Address: Metallographic Exhibit
Metal Exposition
Convention Halls
Philadelphia 4, Pa.

## CLASSIFICATION OF MICROS

1. Toolsteels and tool alloys
2. Stainless and heat resisting steels
3. Other steels and irons
4. Aluminum, magnesium, beryllium, titanium and their alloys
5. Copper, zinc, lead, nickel and their alloys
6. Metals and alloys not otherwise classified
7. Series showing transitions or changes during processing
8. Surface phenomena
9. Results by unconventional techniques (other than electron micrographs)
10. Slags, oxides and inclusions

## AWARDS AND OTHER INFORMATION

A committee of judges will be appointed by the Metal Congress management which will award a First Prize (a medal and blue ribbon) to the best in each classification. Honorable Mentions will also be awarded (with appropriate medals) to other photographs which, in the opinion of the judges, closely approach the winner in excellence.
A Grand Prize, in the form of an engrossed certificate, and a money award of $100 will be awarded the exhibitor whose work is adjudged best in the show, and his exhibit shall become the property of the American Society for Metals for preservation and display in the Society's headquarters.
All other exhibits will be returned to owners by prepaid express or registered parcel post during the week of Oct. 27, 1952.

*Entrants living outside the U. S. A. will do well to send their micrographs by first-class letter mail endorsed "May be opened for customs inspection before delivery to addressee".*

*A "Student Competition" will also be made part of the exhibit, as in the past few years. Rules for entries in the Student Division were published in the February and March issues of Metals Review.*

## 34th National Metal Congress and Exposition

**Philadelphia, Pa.** **October 20 to 24, 1952**

# Exhibitors in National Metal Show

*Convention Hall, Philadelphia, Oct. 20-24, 1952*
*12:00 noon to 10:30 P.M.; Mon., Tues., Wed.*
*10:00 A.M. to 6:00 P.M., Thurs. and Fri.*

## A

**A.B.C. Die Casting Machine Co.**, Chicago. Booth 1763. Die casting-process and die-casting machinery.

**ACCO Steel Casting Div.** (See American Chain and Cable Co., Inc.)

**Acme Mfg. Co.**, Detroit. Booth 1716. Grinding, polishing, buffing and deburring machines. Automatic welding positioners.

**Acme Steel Co.**, Chicago. Booth 1977. Metal stitchers.

**Acorn Tool & Manufacturing, Inc.**, Cincinnati, Ohio. Booth 1016. Tools; dies; stampings; special machines.

**Air Products, Inc.**, Emmaus, Pa. Booth 1662. Oxygen generators and plants; cutting and welding equipment.

**Air Reduction Sales Co.**, New York City, Booth 1623. Gas and arc welding and cutting equipment.

**Ajax Electric Co., Inc.**, Philadelphia. Booth 624. Salt bath brazing and heat treating.

**Ajax Electrothermic Corp.**, Trenton, N. J. Booth 624. Electric induction furnaces for melting, forging and heating.

**Ajax Engineering Corp.**, Trenton, N. J. Booth 624. Electric induction melting furnaces.

**Ajusto Equipment Co.**, Toledo, Ohio. Booth 1376. Adjustable chairs and stools.

**Allegheny Ludlum Steel Corp.**, Brackenridge, Pa. Booth 141. Stainless, tool and electrical steels; carbide products; forgings; cast-to-shape products.

**Allen Manufacturing Co.**, Hartford, Conn. Booth 1825. Screws and other fasteners.

**Allied Chemical & Dye Corp.**, General Chemical Div., New York City. Booth 1019. Chemicals for grain refinement, powder metallurgy, heat treatment, degreasing and electroplating; laboratory reagents; fluxes.

**Allison Co.**, Bridgeport, Conn. Booth 1409. Abrasive cutting wheels.

**Alloy Engineering & Casting Co.**, Champaign, Ill. Booth 507. Heat resistant and stainless steel castings and furnace parts.

**Alloy Metal Wire Co., Inc.**, Prospect Park, Pa. Booth 550. Cold drawn wire, rod and strip and finished products.

**Alloy Rods Co.**, York, Pa. Booth 448. Arc welding electrodes.

**Alpha Metals, Inc.**, Jersey City, N. J. Booth 1862. Soldering materials.

**Alvey-Ferguson Co.**, Cincinnati, Ohio. Booth 530. Parts washing machines; conveyer systems.

**American Brake Shoe Co.**, New York City. Booth 130. Heat and corrosion resistant castings; cast iron; high-temperature alloys; hard facing electrodes.

**American Brass Co.**, Waterbury, Conn. Booth 241. Copper and copper alloy welding rods, wire, forgings, sheet, tube and specialty items.

**American Chain & Cable Co., Inc.** (See Campbell Machine Div. and Wilson Mechanical Instrument Div.)

**American Cyanamid Co.**, New York City. Booth 1344. Salt bath heat treating supplies; ladle additions for steel.

**American Cystoscope Makers, Inc.**, New York City. Booth 242. Electrical and optical instruments.

**American Gas Association**, New York City. Booths 1901-1910. Industrial gas applications.

**American Gas Furnace Co.**, Elizabeth, N. J. Booth 1701. Gas furnaces and burners.

**American Machine & Foundry Co.**, New York City. Booth 1124. Wahlstrom float-lock.

**American Machine & Metals, Inc.** (See Riehle Testing Machines Div.)

**American Machinist** (See McGraw-Hill Publishing Co., Inc.)

**American Manganese Steel Div.** (See American Brake Shoe Co.)

**American Metal Market**, New York City. Booth 1871. Publications.

**American Metaseal Corp.**, West New York, N. J. Booth 1138. Plastic materials for elimination of porosity.

**American Nickeloid Co.**, Peru, Ill. Booth 1378. Preplated metals; colored finishes; striped and crimped designs; products made from preplated metals.

**American Non-Gran Bronze Co.**, Berwyn, Pa. Booth 1946. Bronze castings, solid and cored bars, finish machined parts.

**American Optical Co.**, Buffalo, N. Y. Booth 442. Scientific instruments; microscopes and metallographs; comparators.

**American Platinum Works**, Newark, N. J. Booth 1972. Silver brazing products and methods.

**American Pullmax Co., Inc.**, Chicago. Booth 1449. Sheet metal and plate cutting machinery.

**American Silver Co., Inc.**, Flushing 54, N. Y. Booth 709. Silver solders; precious metals.

**American Society for Metals**, Cleveland. Booth 1619. Technical books and magazines; educational services.

**American Society for Metals**, Philadelphia Chapter. Booth 1018. Technical and educational activities.

**American Wheelabrator & Equipment Corp.**, Mishawaka, Ind. Booth 1749. Blast-cleaning machines; shot-peening equipment; dust collectors.

**Ampco Metal, Inc.**, Milwaukee. Booth 1217. Aluminum bronze castings, welding electrodes, dies; safety tools; pumps.

**Amplex Mfg. Co.**, Detroit. Booth 1954. Powder metal parts; oilless bearings.

**Ansco Div.**, General Aniline & Film Corp., Binghamton, N. Y. Booth 929, X-ray films and chemicals for radiography.

**Applied Hydraulics.** (See Industrial Publishing Co.)

**Applied Research Laboratories**, Montrose, Calif. Booth 1757. Spectrochemical equipment.

**Arcair Co.**, Bremerton, Wash. Booth 1132. Gouging machines and cutting apparatus.

**Arcos Corp.**, Philadelphia. Booth 309. Arc welding electrodes; oxy-arc cutting process.

**Aronson Machine Co.**, Arcade, N. Y. Booth 718. Positioners and turning rolls.

**Arwood Precision Casting Corp.**, Brooklyn 1, N. Y. Booth 1758. Ferrous and nonferrous precision investment castings.

**Atlas Press Co.**, Kalamazoo, Mich. Booth 602. Lathes, drills, shapers.

**Atomic Energy of Canada, Ltd.**, Commercial Products Division, Ottawa, Ont., Canada. Booth 1479. Radium and isotopes for nondestructive testing.

**Automatic Temperature Control Co., Inc.**, Philadelphia. Booth 1768. Temperature and program controls; valves.

**Automotive Industries**, Philadelphia. Booth 1468. Publications.

**Avon Tube Div.**, Higbie Mfg. Co., Rochester, Mich. Booth 1961. Tube fabricating and bending; welded steel tubing.

## B

**Babcock & Wilcox Co.**, Beaver Falls, Pa. and New York City. Booth 340. Welded and seamless steel tubing.

**Baird Associates, Inc.**, Cambridge, Mass. Booth 416. Laboratory instruments; direct-reading spectrometers.

**Baker & Co., Inc.**, Newark, N. J. Booth 1210. Industrial and laboratory furnaces; laboratory ware.

**Baldwin-Lima-Hamilton Corp.**, Eddystone, Pa. Booth 1520. Metalworking presses; testing machines; strain gages.

**Barber-Colman Co.** (See Wheelco Instruments Div.)

**Bausch & Lomb Optical Co.**, Rochester, N. Y. Booth 405. Microscopes and metallographic equipment; spectrographic accessories.

**Bell & Gossett Co.**, Morton Grove, Ill. Booth 1772. Pumps, heat exchangers.

**Bendix-Westinghouse Automotive Air Brake Co.**, Elyria, Ohio. Booth 1710. Industrial air controls.

**Beryllium Corp.**, Reading, Pa. Booth 1539. Beryllium and beryllium alloys and products.

**Black Drill Co.**, Cleveland. Booth 1350. Drilling equipment.

**Blackstone Mfg. Co., Inc.** (See Steel Parts Mfg. Co.)

**Blakeslee & Co., G. S.**, Chicago. Booth 540. Metal washers and degreasers.

**Bowser Inc.**, Terryville, Conn. Booth 1658. Liquid control systems; filters.

**Brainard Steel Div.**, Sharon Steel Corp., Warren, Ohio. Booth 660. Steel strapping, strapping tools and accessories.

**Bridgeport Brass Co.**, Bridgeport, Conn. Booth 1035. Brass and copper mill products; sheet, rod, wire and tubing.

**Brown Instruments Div.** (See Minneapolis-Honeywell Regulator Co.)

**Bruning Co., Inc., Charles**, Chicago. Booth 1440. Printing, developing and drafting equipment.

**Brush Development Co.**, Cleveland. Booth 1358. Surface analyzers; strain analyzers.

**Buck Tool Co.**, Kalamazoo, Mich. Booth 905. Chucks.

**Buehler, Ltd.**, Chicago. Booth 208. Sample preparation equipment; microtesting machines; optical equipment.

**Bundy Tubing Co.**, Detroit. Booth 1839. Tubing.

## C

**Cam-Lok Division**, Empire Products, Inc., Cincinnati, Ohio. Booth 1116. Welding accessories.

**Campbell Div., Andrew C.** (See American Chain & Cable Co., Inc.)

**Carboloy Div.** (See General Electric Co.)

**Carlin Co., Inc., J. A.**, Bala-Cynwyd, Pa. Booth 1310. Press brakes; die sets; burning torches.

**Carpenter Steel Co.**, Reading, Pa. Booth 350. Alloy steels, stainless and toolsteels; high-temperature alloys.

**Casting Engineers, Inc.**, Chicago. Booth 805. Precision investment castings.

**Challenge Machinery Co.**, Grand Haven, Mich. Booth 932. Special machinery; foundry equipment.

**Chase Brass & Copper Co.**, Waterbury, Conn. Booth 1220. Copper and brass shapes and products.

**Chem-Fin Corp.**, (See J. W. Rex Co.)

**Chicago Metal Hose Corp.** (See Flexonics Corp.)

**Chicago Rivet & Machine Co.**, Bellwood, Ill. Booth 1819. Automatic rivet setters.

**Chicago Tool & Engineering Co.**, Chicago. Booth 1023. Welding accessories; machine tool accessories and attachments.

**Chilton Co., Inc.** (See *Automotive Industries* and *Iron Age*.)

**Chrysler Corp.** (See Amplex Mfg. Co.)

**Cincinnati Milling & Grinding Machines, Inc.**, Cincinnati, Ohio. Booth 1610. Flame hardening machine; machine tools.

**Cities Service Oil Co.**, New York City. Booth 1309. Cutting and grinding oils; drawing compounds; greases; rust preventives.

**Climax Molybdenum Co.**, New York City. Booth 515. Molybdenum and molybdenum alloys.

**Clinton Machine Co.**, Warner Div., Detroit. Booth 610. Disintegrating machines for repair of dies, etc.

**Coles Cranes, Inc.**, Joliet, Ill. Booth 1369. Mobile cranes.

**Collins Micro-Flat Co.**, Los Angeles. Booth 1281. Granite surface plates and angle iron stands.

**Commander Manufacturing Co.**, Chicago. Booth 531. Drills and chip breakers.

**Commercial Shearing & Stamping Co.**, Youngstown, Ohio. Booth 1616. Pressed metal products; hydraulic hoist equipment.

**Continental Industrial Engineers, Inc.**, Chicago. Booth 1934. Industrial furnaces; special machines; production lines; complete plants.

**Continental Tooling Service, Inc.**, Dayton, Ohio. Booth 1027. Special tools; product styling; machine designing.

**Cooper Metallurgical Associates**, Cleveland. Booth 923. Boron and boron compounds.

**Crane Packing Co.**, Chicago. Booth 811. Lapping machines, tube rolling control; packings, mechanical seals; pipe joint and gasket compounds.

**Crucible Steel Co. of America**, New York City. Booth 104. High speed steel; alloy, stainless and special-purpose steels.

**Curtis Machine Div.**, Lincoln Park Industries, Inc., Jamestown, N. Y. Booth 937. Grinding and polishing machines.

## D

**Dake Engine Co.**, Grand Haven, Mich. Booth 1761. Hydraulic industrial presses.

**Delaware Tool Steel Corp.**, Wilmington, Del. Booth 1275. Controlled atmosphere furnaces.

**Delta Power Tool Div.**, Rockwell Mfg. Co., Milwaukee. Booth 1650. Metalworking and machine tools; spot and arc welders.

**De Sanno & Son, A. P.**, Phoenixville, Pa. Booth 1252. Grinding wheels; abrasives; cutoff machines.

**Detrex Corp.**, Detroit. Booth 1849. Cleaning and degreasing equipment; cleaning compounds and solvents; surface finishing materials and equipment.

**DeWalt, Inc.**, Lancaster, Pa. Booth 1120. Metal-cutting machines.

**Diamond Iron Works Inc.** (See Mahr Manufacturing Co.)

**Distillation Products Industries**, Rochester, N. Y. Vacuum systems and furnaces; pumps; gages.

**Diversey Corp.**, Chicago. Booth 646. Metal-cleaning compounds and rust preventives.

**Diversified Metal Products Co.**, Los Angeles. Booth 1767. Machine tools and equipment.

**DoAll Co.**, Des Plains, Ill. Booths 524 and 623. Machine tools; gaging systems; testing machines.

**Dow Chemical Co.**, Midland, Mich. Booth 730. Magnesium and magnesium alloy products.

**Dow Furnace Co.**, Detroit. Booth 1315. Controlled atmosphere furnaces; gas cyaniding.

**Drever Co.**, Philadelphia. Booth 1980. Industrial furnaces; ammonia dissociators and other atmosphere equipment.

**Driver Co., Wilbur B.**, Newark, N. J. Booth 521. Electrical resistance alloys in rod, wire and strip form.

**Driver-Harris Co.**, Harrison, N. J. Booth 1919. Nickel alloys; high-temperature materials.

## E

**East Shore Machine Co.**, Cleveland. Booth 1455. Keyway broaches.

**Eaton Mfg. Co.**, Reliance Division, Massillon, Ohio. Booth 912. Spring lock washers; cold finished steel.

**Eclipse Fuel Engineering Co.**, Rockford, Ill. Booth 1926. Gas burners; air-gas mixers; valves; pressed steel pots; furnaces.

**Ekstrand & Tholand, Inc.**, New York City. Booth 1567. Powder metal parts; powder iron.

**Elastic Stop Nut Corp. of America**, Union, N. J. Booth 640. Stop nuts and self-locking fasteners.

**Eldorado Mining & Refining, Ltd.** (See Atomic Energy of Canada, Ltd.)

**Electric Furnace Co.**, Salem, Ohio. Booth 341. Gas-fired, oil-fired and electric heat treating furnaces; controlled atmosphere equipment.

**Electro-Alloys Div.** (See American Brake Shoe Co.)

**Electro Arc Mfg. Co.**, Ann Arbor, Mich. Booth 1778. Electrical tap extractor and driller.

**Elox Corp. of Michigan,** Clawson, Mich. Booth 1355. Tapping tools; tap extractors; drills.

**Empire Products, Inc.** (See Cam-Lok Div.)

**Engineered Castings Div.** (See American Brake Shoe Co.)

**Enthone, Inc.,** New Haven, Conn. Booth 1867. Degreasing and electroplating equipment and chemicals; derusting process.

**Ercona Corp.,** New York City. Booth 920. Scientific instruments.

**Erico Products, Inc.,** Cleveland. Booth 1482. Cable splicing processes; welding processes.

**Esbenson Co., Iver J.** (See Heat Engineering Co.)

**Eutectic Welding Alloys Corp.,** Flushing, N. Y. Booth 1001. Welding rods and electrodes.

F

**Fahralloy Co.,** Harvey, Ill. Booth 1969. Stainless steel and heat resisting castings.

**Fawick Airflex Co., Inc.,** Cleveland. Booth 1960. Industrial clutches and seals; valves; brakes.

**Ferner Co., Inc., R. Y.,** Boston. Booth 1123. Fatigue testing machines; portable hardness testers; microscopes.

**Firth Sterling, Inc.,** Pittsburgh. Booth 421. Tool and stainless steels; sintered carbides; carbide-tipped tools; machining method.

**Flexonics Corp.,** Maywood, Ill. Booth 534. Flexible metal tubing and hose; expansion joints.

**Flow.** (See Industrial Publishing Co.)

**Fostoria Pressed Steel Corp.,** Fostoria, Ohio. Booth 1571. Infrared heating equipment; industrial lighting.

**Foundry.** (See Penton Publishing Co.)

G

**Gas Appliance Service, Inc.,** Chicago. Booth 1920. Gas-air mixers; high speed burners; small furnaces; air heaters.

**Gehnrich & Gehnrich, Inc.,** Woodside, L. I., N. Y. Booth 1916. Gas furnaces and ovens.

**General Alloys Co.,** Boston. Booth 204. Heat resisting alloy castings and furnace mechanisms; stainless steel castings.

**General Aniline & Film Corp.** (See Ansco Div.)

**General Chemical Div.** (See Allied Chemical and Die Corp.)

**General Electric Co.,** Apparatus Sales Div., Schenectady, N. Y. Booth 251. Testing and inspection equipment; welding equipment; furnaces.

**General Electric Co.,** Carboloy Dept., Detroit. Booth 816. Cemented carbide tools, dies and wear parts.

**General Electric Co.,** X-Ray Dept., Milwaukee. Booth 1549. X-ray and radiographic equipment.

**General Motors Corp.** (See Rochester Products Div.)

**Globe Stamping Div.,** Hupp Corp., Cleveland. Booth 1354. Tumbling barrels for deburring, finishing.

**Goodrich Co., B. F.,** Akron, Ohio. Booth 617. Rivnut blind fasteners.

**Graham Mfg. Corp.,** Ferndale, Mich. Booth 933. Stud welders and contract welding.

**Gray Co. Inc.,** Minneapolis. Booth 924. Lubricators.

**Gray Iron Founders' Society, Inc.,** Cleveland. Booth 1340. Educational and technical activities.

**Gregory Industries, Inc.** (See Nelson Stud Welding Div.)

**Griffith-Raguse & Co., Inc.,** Philadelphia. Booth 1310. Grinding wheels and abrasives; electric tools; brushes; blades; sanders.

**Griswold Mfg. Co.,** Devon, Pa. Booth 1016. Optical precision equipment.

**Gulf Oil Corp.,** Pittsburgh. Booth 1515. Lubricants, cutting and quenching oils.

H

**H & H Tube & Mfg. Co.,** Detroit. Booth 1487. Seamless brass and copper tubing; lockseam tubing; strip.

**H P L Mfg. Co.,** Cleveland. Booth 1951. Stampings.

**Hacker & Co., Inc., William J.,** New York City. Booth 1279. Microscopes and accessories; laboratory equipment.

**Hammond Machinery Builders, Inc.,** Kalamazoo, Mich. Booth 1130. Polishing, buffing and grinding equipment.

**Handy & Harman,** New York City. Booth 110. Silver brazing by induction heat and torch.

**Harnischfeger Corp.,** Milwaukee. Booth 1525. Arc welders; positioners; materials handling equipment.

**Harper Electric Furnace Corp.,** Buffalo, N. Y. Booth 1857. High-temperature electric furnaces.

**Harshaw Chemical Co.,** Cleveland. Booth 1420. Plating and finishing supplies; chemicals; laboratory equipment.

**Hayes, Inc., C. I.,** Providence, R. I. Booth 1262. Controlled atmosphere furnaces; electric heat treating equipment.

**Haynes Stellite Div.,** Union Carbide & Carbon Corp., Kokomo, Ind. Booth 1202. Corrosion resistant and high-temperature alloys; hard facing materials; metal-cutting tools.

**Heath Engineering Co.,** Fort Collins, Colo. Booth 916. Oxy-acetylene torch guiding machine.

**Heintz Mfg. Co.,** Philadelphia. Booth 1668. Auto bodies; metal pressing and stampings.

**Heli-Coil Corp.,** Danbury, Conn. Booth 1955. Inserts for protecting and strengthening screw threads.

**Heller Machine Co.,** New York City. Booth 1620. Sawing machines; milling and drilling machines.

**Heller Maschinenfabrik, Gebr.,** Nurtingen, Germany. (See Heller Machine Co.)

**Heppenstall Co.,** Pittsburgh. Booth 1572. Forgings; shear knives; die blocks.

**Higbie Mfg. Co.** (See Avon Tube Div.)

**Hitchiner Mfg. Co., Inc.** (See Metal Products Sales Co.)

**Hones, Inc., Charles A.,** Baldwin L. I., N. Y. Booth 1912. Gas-fired oven furnaces; burners.

**Houghton & Co., E. F.,** Philadelphia. Booth 724. Cutting oils; heat treating compounds; metal cleaners.

**Howard Foundry Co.,** Chicago. Booth 501. Sand and permanent mold castings of aluminum, brass, bronze, magnesium and semi-steel.

**Hupp Corp.,** (See Globe Stamping Div.)

I

**Illinois Testing Laboratories, Inc.,** Chicago. Booth 1457. Temperature, air and dew point measuring instruments.

**Induction Heating Corp.,** Brooklyn, N. Y. Booth 1870. Electric induction heating equipment.

**Industrial Heating.** (See National Industrial Publishing Co.)

**Industrial Heating Equipment Co.,** Detroit. Booth 1439. Burners; heat treating furnaces.

**Industrial Press,** New York City. Booth 1339. Trade papers and engineering data.

**Industrial Publishing Co.,** Cleveland. Booth 1361. Publications.

**Industrial Tectonics, Inc.,** Ann Arbor, Mich. Booth 919. Precision balls of stainless and special steels.

**Industry & Welding** (See Industrial Publishing Co.)

**Institute of Industrial Launderers,** Cleveland. Booth 1362.

**International Nickel Co., Inc.,** New York City. Booths 230 and 324. Nickel and nickel alloys; nickel steel and cast iron; stainless steels; precious metals.

**Invincible Vacuum Cleaner Mfg. Co.,** Dover, Ohio. Booth 1256. Vacuum cleaning equipment; welding flux recovery equipment.

**Ipsen Industries, Inc.,** Rockford, Ill. Booth 131. Automatic heat treating units; generators.

**Iron Age,** New York City. Booth 1842. Magazines and reprints.

J

**Janney Cylinder Co.,** Philadelphia. Booth 1327. Finish-machined products made from centrifugal castings.

**Jarrell-Ash Co.,** Boston. Booth 1205. Precision scientific apparatus.

**Jensen Specialties, Inc.,** Detroit, Mich. Booth 1415. Electric ovens.

**Johnson & Son, Inc., S. C.,** Racine, Wis. Booth 1119. Protective wax coatings for metals; metalworking lubricants.

**Jones Co., C. Walker,** Philadelphia. Booth 1257. Industrial work gloves.

K

**K-G Equipment Co., Inc.** (See Air Products, Inc.)

**K S M Products, Inc.**, Merchantville, N. J. Booth 834. Equipment for stud welding.

**Kanthal Corp.**, Stamford, Conn. Booth 1266. Electric resistance wire; high-temperature alloys; heating elements.

**Kearney & Trecker Corp.** (See Walker-Turner Div.)

**Kelite Products, Inc.**, Los Angeles. Booth 1260. Metal cleaning materials.

**Keleket X-Ray Corp.**, Covington, Ky. Booth 1809. Radiographic and X-ray inspection equipment.

**Kemp Mfg. Co., C. M.**, Baltimore, Md. Booth 1801. Industrial gas carburetors; gas burners; immersion heating.

**Kennametal Inc.**, Latrobe, Pa. Booth 1319. Metal-cutting tools; wear resistant parts.

**Kerns Co., L. R.**, Chicago. Booth 651. Industrial lubricants and drawing compounds; rust preventives.

**Keystone Drawn Steel Co.**, Spring City, Pa. Booth 1965. Cold finished steel bars and shafting.

**King, Andrew**, Ardmore, Pa. Booth 121. Portable Brinell hardness tester.

**Knapp Mills Inc.**, Wilmington, Del. Booth 808. Lead and lead linings; equipment and products.

**Kold-Hold Manufacturing Co.**, Lansing, Mich. Booth 1462. Platecoils for heating or cooling tanks.

L

**Latrobe Steel Co.**, Latrobe, Pa. Booth 1649. High speed, tool and die steels.

**Leeds & Northrup Co.**, Philadelphia. Booth 304. Temperature recorders and controllers; heat treating furnaces.

**Lepel High Frequency Labs., Inc.**, New York City. Booth 1114. High-frequency induction heating equipment.

**Lincoln Electric Co.**, Cleveland. Booth 140. Arc welding equipment and supplies.

**Lincoln Park Industries, Inc.** (See Curtis Machine Div.)

**Lindberg Engineering Co.**, Chicago. Booth 330. Heat treating furnaces; blowers; hydraulic equipment; laboratory equipment.

**Linde Air Products Co.**, New York City. Booth 1202. Gas welding and cutting equipment.

**Lynchburg Foundry Co.**, Lynchburg, Va. Booth 1927. Cast iron pipe and fittings.

M

**Machine Design.** (See Penton Publishing Co.)

**Machinery.** (See Industrial Press)

**Magna Engineering Corp.**, Menlo Park, Calif. Booth 751. Drilling machines.

**Magnaflux Corp.**, Chicago. Booth 537. Magnetic flaw detection equipment; thickness gages.

**Magnetic Analysis Corp.**, Long Island City, N. Y. Booth 518. Magnetic inspection equipment; comparators.

**Mahr Mfg. Co. Div.**, Diamond Iron Works, Inc., Minneapolis. Booth 1557. Heat treating furnaces.

**Makepeace Co., D. E.** Attleboro, Mass. Booth 560. Gold, silver and gold-filled sheet, wire and tubing.

**Malayan Tin Bureau**, Washington, D. C. Booth 858. Information service on tin.

**Mall Tool Co.**, Chicago. Booth 1276. Drills; grinders; sanders; buffers; small tools.

**Mallory & Co., Inc., P. R.**, Indianapolis, Ind. Booth 1950. Resistance welding supplies; special nonferrous products; contact materials.

**Manco Mfg. Co.**, Bradley, Ill. Booth 1480. Cutting, punching, shearing and riveting equipment.

**Marlie Trading, Inc.** (See Tyler Mfg. Co.)

**Martindale Electric Co.**, Cleveland. Booth 1762. Grinding and filing equipment; saws; dust masks.

**Master Builders Co.**, Cleveland. Booth 1777. Industrial floors and heavy equipment grouts.

**Materials & Methods.** (See Reinhold Publishing Corp.)

**McGraw-Hill Publishing Co., Inc.**, New York City. Booth 1263. Publications.

**Mechanical Handling Systems, Inc.**, Detroit. Booth 1472. Conveyorized continuous handling systems; racks.

**Metalmaster Div.** (See Clinton Machine Co.)

**Metal Products Sales Co.**, West Hartford, Conn. Booth 817. Precision investment castings; die castings.

**Metal Progress.** (See American Society for Metals.)

**Metal & Thermit Corp.**, New York City. Booth 430. Arc welding electrodes and equipment; thermit welding.

**Metallurgical Laboratories, Inc.** (See Metlab.)

**Metals & Controls Corp.**, Attleboro, Mass. Booth 1816. Temperature control devices.

**Metals Review.** (See American Society for Metals.)

**Metals Sections, Special Libraries Association.** (See Special Libraries Association.)

**Metalweld, Inc.**, Philadelphia. Booth 1272. Industrial maintenance; corrosion protection; welding; metallizing; sand-blasting.

**Metlab Co.**, Philadelphia. Booth 1007. Heat treating services.

**Michiana Products Corp.**, Michigan City, Ind. Booth 1240. Stainless, heat resistant and abrasion resistant castings.

**Micrometrical Mfg. Co.**, Ann Arbor, Mich. Booth 1458. Surface analysis equipment.

**Mid-West Abrasive Co.**, Owosso, Mich. Booth 1024. Grinding wheels; abrasive belts.

**Miller Electric Mfg. Co.**, Appleton, Wis. Booth 631. Arc welders.

**Milne & Co., A.**, New York City. Booth 506. Hollow die steel and graphitic toolsteels.

**Milton Equipment Co.**, Philadelphia. Booth 1562. Brakes, rolls, shears; sheet metal working machinery.

**Minneapolis-Honeywell Regulator Co.**, Philadelphia. Booth 211. Temperature measurement and control instruments; program controllers.

**Morrison Industries, Inc.**, Cleveland. Booth 1804. Gas equipment.

**Morton Gregory Corp.** (See Nelson Stud Welding Div.)

**Mult-A-Frame Div., Ainsworth Mfg. Corp.**, Detroit. Booth 1343. Framing steel.

N

**National Bearing Div.** (See American Brake Shoe Co.)

**National Carbon Co. Div.**, Union Carbide & Carbon Corp., New York City. Booth 1202. Carbon and graphite molds, linings, electrodes, heat exchangers, pipe and fittings.

**National Cored Forgings Co., Inc.**, South Norwalk, Conn. Booth 151. Cored nonferrous forgings.

**National Cylinder Gas Co.**, Chicago. Booth 1989. Industrial gases; welding and cutting equipment.

**National Diamond Laboratory**, New York City. Booth 1477. Industrial diamond tools.

**National Industrial Publishing Co.**, Pittsburgh. Booth 1959. Publications.

**National Lead Co.**, New York City. Booth 411. Kirksite dies; solders and fluxes; babbitt metals.

**National Precision Castings Co.**, Clifton Heights, Pa. Booth 1771. Precision castings.

**National Research Corp.**, Cambridge, Mass. Booth 1211. Vacuum-cast metals; high-vacuum furnaces and equipment.

**National Spectrographic Labs., Inc.**, Cleveland. Booth 1471. Spectrographic equipment.

**National Torch Tip Co.**, Pittsburgh. Booth 1372. Welding supplies.

**National Welding Supply Assoc.**, Philadelphia. Booth 1380. Welding distributors.

**Nelco Tool Co., Inc.**, Manchester, Conn. Booth 1134. Machine tools and accessories.

**Nelson Stud Welding Div.**, Gregory Industries, Inc., Lorain, Ohio. Booth 1850. Stud welding equipment.

**New Equipment Digest.** (See Penton Publishing Co.)

**New Hermes, Inc.**, New York City. Booth 1478. Portable machines for engraving on metal.

**Newark Wire Cloth Co.**, Newark, N. J. Booth 1853. Industrial wire cloth; strainers, screens, sieves.

**Nicholas Equipment Co.**, Bellevue, O. Booth 911. Machine tools; buffers and polishers.

**North American Philips Co., Inc.**, Mt. Vernon, N. Y. Booth 1861. X-ray diffraction equipment; electron microscopes.

O

**Oakite Products, Inc.**, New York City. Booth 1715. Cleaning compounds and materials; rust preventives; cutting oils.

**Ohio Crankshaft Co.**, Cleveland. Booth 1377. High-frequency induction heating equipment.

**Ohio Seamless Tube Co.**, Shelby, Ohio. Booth 1820. Seamless and welded tubing, fabricated and forged.

**Ohio Steel Foundry Co.**, Springfield, Ohio. Booth 1658. Steel castings.

**Olsen Testing Machine Co., Tinius**, Willow Grove, Pa. Booth 1419. Universal testing machines.

**O'Neil-Irwin Mfg. Co.**, Lake City, Minn. Booth 630. Hand-operated benders, shears, punches.

**Opplem Co., Inc.**, New York City. Booth 115. Optical, engineering and surveying instruments.

**Osborn Mfg. Co.**, Cleveland. Booth 729. Power and hand brushes.

P

**Pangborn Corp.**, Hagerstown, Md. Booth 901. Blast-cleaning machines.

**Park Chemical Co.**, Detroit. Booth 312. Heat treating materials.

**Parker Machine Co., Inc.**, Brooklyn, N. Y. Booth 1732. Machine tools and accessories.

**Parker Rust Proof Co.**, Detroit. Booth 1909. Rustproofing materials; drawing compounds.

**Partlow Corp.**, New Hartford, N. Y. Booth 1577. Temperature controllers, recorders, timers and accessories.

**Penton Publishing Co.**, Cleveland. Booth 1733. Publications.

**Peters-Dalton, Inc.**, Detroit. Booth 1410. Dust collectors; spray booths.

**Philadelphia Bronze & Brass Co.**, Philadelphia. Booth 1587. Brass and bronze castings.

**Philadelphia Electric Co.**, Philadelphia. Booth 1483. Utilities—gas, steam and electricity.

**Phillips Mfg. Co., Inc.**, Chicago. Booth 635. Vapor degreasers.

**Physicists Research Co.** (See Micrometrical Mfg. Co.)

**Picker X-Ray Corp.**, White Plains, N. Y. Booth 441. X-ray apparatus and accessories; radiographic equipment.

**Pittsburgh Tube Co.**, Pittsburgh. Booth 240. Mechanical steel tubing.

**Polyplastex International, Inc.**, New York City. Booth 927. Impregnation materials and methods for porous castings.

**Porter-McLeod Machine Tool Co., Inc.**, Hatfield, Mass. Booth 1271. Polishing, sawing and grinding machines.

**Porter Precision Products Co.**, Cincinnati, Ohio. Booth 1025. Punches and dies.

**Precision Metal Molding.** (See Industrial Publishing Co.)

**Precision Metalsmiths, Inc.**, Cleveland. Booth 1461. Precision castings.

**Precision Products Co.**, Branford, Conn. Booth 1125. Tools and chucks.

**Precision Shapes Inc.**, Suffern, N. Y. Booth 1015. Continuous milling process.

**Precision Welder & Flexopress Corp.**, Cincinnati, Ohio. Booth 842. Resistance welding equipment; auautomatic presses.

**Product Engineering.** (See McGraw-Hill Publishing Co.)

**Production Machine Co.**, Greenfield, Mass. Booth 1540. Polishing, buffing and deburring machines.

**Progressive Welder Sales Co.**, Detroit. Booth 1105. Resistance and arc welding equipment.

**Pyrometer Instrument Co., Inc.** Bergenfield, N. J. Booth 1729. Optical, radiation, surface and immersion pyrometers.

R

**Ransburg Electro-Coating Corp.** Indianapolis, Ind. Booth 1983. Electrostatic detearing and spray finishing processes.

**Raytheon Mfg. Co.**, Waltham, Mass. Booth 1815. Welding heads; power supplies; resistance welding controls.

**Reeves Pulley Co.**, Columbus, Ind. Booth 1553. Variable speed drives and controls.

**Reinhold Publishing Corp.**, New York City. Booth 1454. Publications.

**Rex Co. J. W.**, Lansdale, Pa. Booth 1730. Heat treating specialists.

**Reynolds Metals Co.**, Louisville, Ky. Booth 1550. Aluminum alloys and fabricated parts.

**Richards Co., J. A.**, Kalamazoo, Mich. Booth 1277. Bending and cutting machines.

**Riehle Testing Machines Div.**, American Machine & Metals, Inc., East Moline, Ill. Booth 1239. Tensile, impact, hardness and other mechanical testing machines.

**Rochester Products**, Division of General Motors, Rochester, N. Y. Booth 1031. Welded and brazed steel tubing.

**Rockwell Mfg. Co.** (See Delta Power Tool Div.)

**Rodgers Hydraulics, Inc.**, Minneapolis. Booth 1558. Hydraulic presses; hydrostatic test units; hydraulic machinery.

**Rolle Mfg. Co., Inc.**, Lansdale, Pa. Booth 750. Magnesium castings.

**Rolock, Inc.**, Fairfield, Conn. Booth 1810. Heat and corrosion resisting alloy equipment for heat treating and metal finishing.

**Ryerson & Son, Inc., Joseph T.** Chicago. Booth 318. Alloy steel stocks and service.

S

**"S" Corrugated Quenched Gap Co.** (See Scientific Electric Div.)

**S & S Machinery Co.**, Brooklyn N. Y. Booth 1657. Heavy machinery.

**Sales Service Machine Tool Co.**, St. Paul, Minn. Booth 1467. Power presses; power hack saws.

**Sandvik Steel, Inc.**, New York City. Booth 402. Specialty steels.

**Scherr Co., Inc., George**, New York City. Booth 1269. Precision measuring tools; comparators; gages.

**Scientific Electric Div.**, "S" Corrugated Quenched Gap Co., Garfield, N. J. Booth 1227. High frequency equipment; induction furnaces.
naces.

**Schrader's Son Div., A.**, Brooklyn, N. Y. Booth 1856. Pneumatic machine controls.

**Sciaky Bros., Inc.**, Chicago. Booth 1719. Resistance welding machines.

**Scott & Son, Inc., C. U.**, Rock Island, Ill. Booth 1228. Special heat treating process for stainless steel.

**Scovill Mfg. Co.**, Waterbury, Conn. Booth 1685. High speed brass rod.

**Selas Corp. of America**, Philadelphia. Booth 1601. Heating furnaces and burners.

**Sentry Co.**, Foxboro, Mass. Booth 1324. Hardening furnaces; tube combustion furnaces; diamond blocks and accessories.

**Sharon Steel Corp.** (See Brainard Steel Div.)

**Sheldon Machine Co., Inc.**, Chicago. Booth 841. Lathes, milling machines and shapers.

**Shell Oil Co.**, New York City. Booth 1349. Industrial lubricants and greases; cutting oils; drawing compounds; rust preventives.

**Smith Corp., A. O.**, Milwaukee. Booth 150. Electric welding machines.

**Smith Welding Equipment Corp.**, Minneapolis. Booth 1828. Welding torches, accessories and special-purpose tips.

**Snap-On Tools Corp.**, Kenosha, Wis. Booth 1127. Hand tools for production and industrial maintenance.

**Socony-Vacuum Oil Co.**, New York City. Booth 1876. Cutting and grinding oils; lubricants.

**Solventol Chemical Products, Inc.**, Detroit. Booth 512. Cleaning compounds.

**South Chester Corp.**, Lester, Pa. Booth 1026. Rivets and special fasteners.

**Sparkler Mfg. Co.**, Mundelein, Ill. Booth 1875. Industrial filters.

**Special Libraries Assoc., Metals Section**, New York City. Booth 1020. Books and periodicals; library and reference service.

**Spencer Turbine Co.**, Hartford, Conn. Booth 1942. Vacuum cleaning equipment; turbo compressors; gas boosters.

**Sperry Products, Inc.**, Danbury, Conn. Booth 1754. Ultrasonic instruments for detection of flaws and measuring thickness.

**Standard Alloy Co.**, Cleveland. Booth 1250. Heat resisting furnace parts.

**Standard Die Set Mfrs., Inc.**, Providence, R. I. Booth 1640. Die sets.

**Standard Electrical Tool Co.**, Cincinnati, Ohio. Booth 908. Grinding, buffing; polishing equipment.

**Starrett Co. L. S.**, Athol, Mass. Booth 1843. Mechanics' hand measuring tools and precision instruments; hack saws and band saws.

**Steel.** (See Penton Publishing Co.)

**Steel City Testing Machines, Inc.**, Detroit. Booth 1416. Universal, tensile, hardness, ductility, compression and special testing machines.

**Steel Founders' Society of America**, Philadelphia. Booth 101. Technical and educational services.

**Steel-Parts Mfg. Div. of Blackstone Mfg. Co., Inc.**, Chicago. Booth 1382. Power conveyers and belts.

**Steel Engineering Products (Canada) Ltd.** (See Coles Cranes, Inc.)

**Sterling Electric Motors, Inc.**, Los Angeles. Booth 1949. Electric power drives.

**Stevens Inc., Frederic B.**, Detroit. Booth 244. Plating equipment and supplies.

**Stimpson Co., Inc.**, Brooklyn, N. Y. Booth 605. Fasteners; terminals; screw machine parts; washers.

**Stokes Machine Co. F. J.**, Philadelphia. Booth 1385. Powder metal presses; vacuum equipment.

**Stone Machinery Co., Inc.**, Manlius, N. Y. Booth 551. Metal cutoff machines.

**Stuart Oil Co. D. A.**, Chicago. Booth 1251. Cutting and grinding oils.

**Sub Zero Products Co.**, Cincinnati, Ohio. Booth 1320. Sub-zero industrial chilling machines.

**Sun Oil Co.**, Philadelphia. Booth 1427. Cutting and quenching oils; industrial lubricants.

**Superdraulic Corp.**, Detroit. Booth 1877. Foundry equipment; nondestructive testing equipment.

**Super-Grip Anchor Bolt Co., Inc.**, Philadelphia. Booth 1481. Fasteners.

**Superior Tube Co.**, Norristown, Pa. Booth 1630. Small tubing in titanium and other metals.

**Surface Combustion Corp.**, Toledo, Ohio. Booth 231. Heat treating furnaces and equipment.

**Sutton Engineering Co.**, Bellefonte, Pa. Booth 740. Rolling mill machinery; straightening equipment.

**Swan-Finch Oil Corp.**, New York City. Booth 1032. Industrial lubricants, cutting oils and drawing compounds.

## T

**Taco Heaters Inc.**, Providence, R. I. Booth 1829. Water heaters; oil coolers; heat exchangers; pumps.

**Tempil Corp.**, New York City. Booth 155. Temperature-indicating crayons, pellets and paint.

**Texas Co.**, New York City. Booth 717. Cutting oils, coolants and lubricants.

**Thread-All Sales Co.**, Detroit. Booth 918. Tapping machines; toolholders.

**Tide Water Associated Oil Co.**, New York City. Booth 1450. Cutting and grinding lubricants. Greases, lubricating oils and fuels.

**Tin Research Institute, Inc.**, Columbus, Ohio. Booth 852. Information on production, consumption, properties and uses of tin.

**Tincher Products Co.**, Sycamore, Ill. Booth 1975. Impregnating equipment for recovery and repair of castings.

**Tinnerman Products, Inc.**, Cleveland. Booth 1330. Fasteners—Speednuts, Speedclips and Speedclamps.

**Titanium Alloy Mfg. Div., National Lead Co.**, New Yok City. Booth 1316. Titanium and zirconium metals and alloys; ferro-alloys; zircon foundry products.

**Titanium Metals Corp. of America**, New York City. Booth 120. Titanium and titanium alloys.

**Tocco Div.** (See Ohio Crankshaft Co.)

**Topper Equipment Co.**, Matawan, N. J. Booth 1351. Metal cleaning equipment.

**Torit Mfg. Co.**, St. Paul, Minn. Booth 1881. Dust collectors.

**Turco Products, Inc.**, Los Angeles. Booth 1028. Cleaning and finishing materials for metals and for plant maintenance; coolants; dye-penetrant inspection material.

**Tyler Mfg. Co.**, New York City. Booth 1280. Mill equipment and supplies; machine tools and accessories.

## U

**Uddeholm Co. of America, Inc.**, New York City. Booth 915. Swedish seels; toolsteels; metallographic instruments; hardness testers.

**Udylite Corp.**, Detroit. Booth 216. Plating and polishing equipment.

**Union Carbide & Carbon Corp.** (See Haynes Stellite Div., Linde Air Products Co., and National Carbon Div.).

**Union Steel Products Co.**, Albion, Mich. Booth 1216. Materials handling baskets; pallets.

**U. S. Electrical Motors, Inc.**, Los Angeles. Booth 760. Electrical motors and power drives.

**United States Pipe and Foundry Co., Special Products Div.**, Burlington, N. J. Booth 702. Bonded dual-metal castings; centrifugal casting; cast iron, stainless steel, carbon and alloy steel products.

**United States Plywood Corp.**, New York City. Booth 1282. Metal-covered plywood.

**Upton Electric Furnace Co.**, Detroit. Booth 1519. Furnaces and salt baths.

## V

**Vanadium Corp. of America**, New York City. Booth 618. Vanadium metals, alloys and chemicals.

**Vapofier Corp.**, Chicago. Booth 1953. Gas Generators.

**Versa-Mil Co.**, New York City. Booth 741. Milling, boring and grinding machines.

**Viking Sales Inc.**, Detroit. Booth 928. Arc and resistance welding equipment.

**Waldes Kohinoor, Inc.**, Long Island City, N. Y. Booth 1915. Fasteners; retaining rings.

**Walker-Turner Div., Kearney & Trecker Corp.**, Plainfield, N. J. Booth 1941. Machine tools.

**Wall Colmonoy Corp.**, Detroit. Booth 1131. Hard facing alloys.

**Waukee Engineering Co.**, Milwaukee. Booth 1223. Flowmeters for industrial gases.

**Webber Appliance Co., Inc.**, Indianapolis, Ind. Booth 1368. Furnaces.

**Welding Engineer.** (See McGraw-Hill Publishing Co.).

**Weldwire Co., Inc.**, Philadelphia. Booth 1383. Welding wire.

**Wells Mfg. Co.**, Three Rivers, Mich. Booth 1678. Metal-cutting band-saw machines.

**Westinghouse Electric Corp.**, Pittsburgh. Booth 1510. Welding machines; high-frequency equipment; magnetic materials; furnaces; nondestructive testing equipment.

**Weston Electrical Instrument Corp.**, Newark, N. J. Booth 1011. Electrical measuring instruments and appliances.

**Wheelco Instruments Co.**, Chicago. Booth 641. Temperature measuring, recording and control instruments.

**Whitehead Metal Products Co., Inc.**, Philadelphia. Booth 1238. Nonferrous metals.

**Wiegand Co., Edwin L.**, Pittsburgh. Booth 1244. Electrical heating units.

**Williams, Brown & Earle, Inc.**, Philadelphia. Booth 1232. Laboratory equipment and supplies; instruments; optical devices.

**Wilson Mechanical Instrument Div., American Chain & Cable Co.**, New York City. Booth 706. Tukon and Rockwell hardness testers.

**Worthington Corp.**, Plainfield, N. J. Booth 1720. Welding and assembly positioning equipment.

**Zeiss, Inc., Carl.** (See Ercona Corp.)

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esses, welding metallurgy, weld examination and testing, welding equipment and shop layout, and welfare and safety in the practice of welding. Includes glossary of terms and an index. (K general)

# L

## CLEANING, COATING AND FINISHING

**701-L. Ceramics Shield Stainless for Jets.** Robert G. Hicks. *American Machinist,* v. 96, July 21, 1952, p. 99-100.
Experiments of Stewart-Warner's South Wind Div. on methods of applying several coatings, particularly in jet-engine components. Some results are: doubled metal life at jets when coated properly, minimum intergranular corrosion of some alloys at 1600-2100° F., and proof that coat thickness shou'd range around 0.001-0.003 in. (L27, SS)

**702-L. Ceramics Make Furnace Fixtures Last Longer.** D. K. Krosch. *American Machinist,* v. 96, July 21, 1952, p. 101.
Temperature-resistant coatings extend fixture life 4-5 times at Solar Aircraft Co. (L27, SG-h)

**703-L. How Aluminum Bonding Is Keyed to Production.** William M. Stocker, Jr. *American Machinist,* v. 96, July 21, 1952, p. 108-111.
The steel surface to be coated is machined and cleaned, then the steel is placed in molten aluminum to be "tinned"—which actually creates an Al-Fe alloy surface. After this, the part is placed in a mold and molten Al is poured around it. How Continental Motors Corp. designed the process into its cylinder-head production line. (L15, Al)

**704-L. Ceramics Ease Metal Shortage.** John V. Long. *Automotive Industries,* v. 107, July 15, 1952, p. 40-41, 76, 78, 80, 82.
Application of new series of ceramic coatings for high temperatures developed by Solar Aircraft Co. for protection of stainless steels and high-temperature alloys, especially Type 321. (L27, SS)

**705-L. Electroplating in Industry.** Donald B. McPherson. *Canadian Metals,* v. 15, July 1952, p. 38-39.
Applications of Cr and Ni plating. (L17, Cr, Ni)

**706-L. Deposition of Conducting Films on Glass.** *Chemical Age,* v. 67, July 5, 1952, p. 13-15.
Compares British and American work. (L general)

**707-L. The Plating of Aluminium Articles; Electrodeposition as a Production Process.** *Chemical Age,* v. 67, July 5, 1952, p. 23-27. (Based on article by A. W. Wallbank.)
Previously abstracted from *Electrodepositors' Technical Society,* Advance Copy 7, 1952. See item 479-L, 1952. (L17, Al, Ni, Zn, Cu)

**708-L. Painting Earth Moving Vehicles.** Walter Rudolph. *Industrial Finishing,* v. 28, July 1952, p. 32, 34, 36, 38.
Cleaning and finishing operations at Euclid Road Machinery Co., Cleveland. (L26, ST)

**709-L. How Ten Operations Assure Quality in Hot-Dip Tinning.** Clayton M. Wright. *Industrial Gas,* v. 31, July 1952, p. 3-4, 23-24.
Job-tinning plant of Wright Metalcoaters Inc., South Hackensack, N. J., handles individual parts which vary from 46,000 per lb. to 100 lb. each. Six lines of equipment turn out work calling for tolerances of 0.0001-0.0003 in. coating. (L16, ST, Sn)

**710-L. Phosphoric Acid Treatment Improves Paint Adherence, Corrosion Resistance.** W. G. Patton. *Iron Age,* v. 170, July 17, 1952, p. 138-139.

The Nielizing process for corrosion control and its use in ferrous metal pre-paint conditioning. This process uses a phosphoric acid base. (L26, Fe)

**711-L. Uses for Industrial Coated Abrasives Expanded. Part 1.** John E. Hyler. *Iron Age,* v. 170, July 24, 1952, p. 98-101, July 31, 1952, p. 91-95.

A number of different types of coated abrasives, their uses and recent improvements. Part II. Uses of backstand equipment. Abrasive-belt equipment for tool-grinding, centerless grinding, polishing of metal sheet and strip. (L10)

**712-L. Wash Primer Helps Industry Fight Corrosion.** R. A. Garling. *Iron Age,* v. 170, July 24, 1952, p. 102-107.

A vinyl-resin prime coat developed during World War II for marine uses which has since been adapted to other surfaces. The complex reaction responsible for its bonding properties. (L26, ST)

**713-L. Automatic Acid Bright Dip Has Many Advantages.** K. W. Bennett. *Iron Age,* v. 170, July 24, 1952, p. 108-110.

The continuous bright-dip machine operated by Bastian-Blessing Co., Chicago, for cleaning of small brass parts. Unit output and floor plan. (L12, Cu)

**714-L. The Electropolishing of Nickel in Urea-Ammonium Chloride Melts.** T. P. Hoar and J. A. S. Mowatt. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 7-25, disc., p. 35-41.

Previously abstracted from Advance Copy 1, 1950; item 335-L, 1950. (L13, Ni)

**715-L. The Commercial Electrolytic Polishing of Stainless Steels.** P. A. Charlesworth. *Journal of Electrodepositors' Technical Society,* v. 26, 1950, p. 43-53; disc., p. 63-70.

Previously abstracted from Advance Copy 2, 1950; item 336-L, 1950. (L13, SS)

**716-L. New Developments of Electrolytic Polishing.** H. E. Zentler-Gordon. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 55-62; disc., p. 63-70.

Previously abstracted from Advance Copy 3, 1950; item 337-L, 1950. (L13, CN, SS, Cu, Al)

**717-L. The Electrodeposition of Copper-Cadmium Alloys From Cyanide Solutions.** E. E. Longhurst. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 71-89; disc., p. 125-135.

Previously abstracted from Advance Copy 5, 1950; item 338-L, 1950. (L17, Cu, Cd)

**718-L. The Electrodeposition of Tin-Cadmium Alloys.** P. S. Bennett. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 91-98; disc., p. 125-135.

Previously abstracted from Advance Copy 6, 1950; item 339-L, 1950. (L17, Cd, Sn, ST)

**719-L. Further Work on the Electrodeposition and Properties of Speculum.** P. S. Bennett. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 107-118; disc., p. 125-135.

Previously abstracted from Advance Copy 7, 1950; item 340-L, 1950. (L17, Cu)

**720-L. The X-Ray Structure of Speculum Electrodeposits.** H. P. Rooksby. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 119-124; disc., p. 125-135.

Previously abstracted from Advance Copy 8, 1950; item 341-L, 1950. (L17, M22, Cu)

**721-L. Studies in the Discontinuities in Electrodeposited Metallic Coatings.** U. R. Evans and S. C. Shome. *Journal of Electrodepositors' Technical Society,* v. 26, 1950, p. 137-160; disc., p. 161-167.

Previously abstracted from Advance Copy 9, 1950; item 342-L, 1950. (L17, Ni, Co, Cu, Cr)

**722-L. The Electrodeposition of Tin From Stannous Fluoborate Baths.** N. Parkinson. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 169-176; disc., p. 177-179.

Previously abstracted from Advance Copy 10, 1950; item 343-L, 1950. (L17, Sn)

**723-L. The Etching of Aluminium for Direct Plating With Other Metals.** J. M. Bryan. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 181-186; disc., p. 187-190.

Previously abstracted from Advance Copy 11, 1950; item 344-L, 1950. (L17, Al, Ni, Cu)

**724-L. "Emulsion" Cleaning of Metals.** G. Schmerling. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 191-198; disc., p. 207-212.

Previously abstracted from Advance Copy 12, 1950; item 345-L, 1950. (L12)

**725-L. Surface Active Agents in the Improvement of the Cleaning of Metals.** R. C. Tarring. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 199-206; disc., p. 207-212.

Previously abstracted from Advance Copy 13, 1950; item 346-L, 1950. (L12)

**726-L. Interpretation of Specifications for Electroplated Coatings.** S. Wernick. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 221-227; disc., p. 227-235.

Problems in establishment of specifications fair to both consumer and producer. Determination of thickness of deposits; microstructure; adhesion and porosity; and performance specifications. (L17, S22)

**727-L. A Fast Phosphating Process.** *Machinery Lloyd,* (Overseas Ed.), v. 24, July 5, 1952, p. 103-104.

The Walterisation "PHO" process and a new development of it, the "E" process, which enables extension to mass-production work such as the manufacture of vehicles, aircraft, and shipping where a strongly corrosion resistant coating is essential. (L14)

**728-L. Surface Finishes Improve Performance of Technical Ceramics.** Hans Thurnauer. *Materials & Methods,* v. 36, July 1952, p. 88-91.

Various finishing methods which can significantly add to the service performance of technical ceramics. Ceramic glazes, moisture-repellent treatments, grinding for precision, polished ceramics, controlled surface roughness, and metallic coatings. (L general)

**729-L. Source of Hydrogen in Porcelain-Enameled Steel.** *Metal Progress,* v. 62, July 1952, p. 148, 150. (Condensed from "Relative Importance of Various Sources of Defect-Producing Hydrogen Introduced Into Steel During the Application of Porcelain Enamels", Dwight G. Moore, Mary A. Mason, and William N. Harrison.)

Previously abstracted from *Journal of the American Ceramic Society.* See item 168-L, 1952. (L27, ST)

**730-L. Stainless-Steel Applied Liners.** Helmut Thielsch. *Welding Journal,* v. 31, July 1952, p. 321s-337s.

Review of published and unpublished information on welding procedures used in the fabrication of applied liners; heat treatments, testing procedures, and code requirements. 68 ref. (L24, SS, ST)

**731-L. Fourteen Hundred Dollars Saved in Eight Hours.** *Welding Journal,* v. 31, July 1952, p. 595.

Metallizing repair of worn Monel shaft used by a New York harbor tugboat. (L24, Ni)

**732-L. Bonderizing for Wiredrawing. The Application of Bonderizing in Needle Wire Production.** N. J. Strasser. **The Application of Bonderizing in Section Drawing.** H. F. Sanderson. **Some Production Experiences With Bonderizing for Cold Drawing of Steel Wire.** W. Holloway. *Wire Industry,* v. 19, July 1952, p. 635-645.

An introductory discussion is followed by consideration of specific applications of bonderizing. (L14, F28, ST)

**733-L.** (English.) **Some Factors Influencing the Adhesion of Films Produced by Vacuum Evaporation.** O. S. Heavens. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 51-55; disc., p. 55-56.

Results of influence of Cr on adhesion of Ag and Al to glass. (L25, Ag, Al)

**734-L.** (French.) **An Apparatus for Cathodic Sputtering Permitting Production of Layers of Controlled Density During Formation.** A. Andant. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 47-48.

The optical density of the deposits is measured during sputtering (a beam of light passes through the target plate and the metallic cathode which is perforated for this purpose.) The apparatus also provides control of the purity of the gas in the region where the sputtering takes place. (L25, P17)

**735-L.** (French.) **Vacuum Evaporation Apparatus for Metallization of Interferometric Films.** J. Roig and Descamps. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 59-61; disc., p. 61.

For deposition of Ag and Al. Characteristic features are diagrammed. (L25)

**736-L.** (French.) **Protection of Optical Glasses and Aluminized Mirrors.** Flamant. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 76-80.

Behavior of films used for increasing or decreasing the reflectivity of glass, and of films likely to be used for protection of metallic deposits, when they are exposed to an atmosphere containing sea air, at 35° C., during a time sufficient to cause deterioration. The fluorides used either as protecting films or for anti-reflection treatment had poor resistance. Silicon and SiO are practically unalterable when deposited on glass. They give the best protection for reflecting surfaces of metallic Al. But this protection disappears because of cracking. $TiO_2$ and $Al_2O_3$ films are also discussed. (L25, P17, R3, Al)

**737-L.** (French.) **Electropolishing of Al-Si-Fe for Micrographic Examinations.** G. Meynet and R. Assibat. *Revue de l'Aluminium,* v. 29, May 1952, p. 180-182.

By cutting to a minimum the duration of electropolishing and by using an electrolyte composed of perchloric acid, ethyl alcohol, and butycellosolve, electropolishing of light-alloy test samples containing Si was achieved without corrosion of the silicon lamellas. (L13, Al)

**738-L.** (French.) **Chromium-Plated Aluminum Engine Cylinders. Work of Mahle Firm.** E. Meyer Rässler. *Revue de l'Aluminium,* v. 29, May 1952, p. 200-204.

Work of German firm. Micrographic studies of the Al-plated surfaces are illustrated. 10 ref. (L17, M27, Al, Cr)

**739-L.** (French.) **Experimental Apparatus for Determination of Adhesion of Varnish to the Base. Variation of Adhesion in Relation to Condition of the Metal Surface. Experimental Results.** Otto Cuzzer, Carlo Pizzuto, and Licio Caccavo. *Revue de Metallurgie,* v. 49, June 1952, p. 423-435.

The apparatus used. Typical results are analyzed and interpreted. Data are charted for adhesion of various coatings to different ferrous and nonferrous metals and alloys. Micrographs. (L26)

**740-L.** (French.) **Anodic Protection of Light Alloy Construction.** G. Moressée. *Soudure et Techniques connexes,* v. 6, May-June, 1952, p. 123-128.

Treatment of resistance welded pieces to assure their protection against corrosion: anodic oxidation, sulfuric acid, and chromic acid processes. Includes tabular data. (L19, Al)

**741-L.** (German.) **Experiments on Protective-Gas Annealing, Instead of Pickling, in Sheet-Steel Enameling.** W. Kerstan. *Berichte der Deutschen Keramischen Gesellschaft e. V und des Vereins Deutscher Emailfachleute e.V.,* v. 29, Mar. 1952, p. 81-87.

Experiments revealed great advantages over pickling. Photographs, tables, and photomicrographs. (L27, J23, ST)

**742-L.** (German.) **Measurements and Photographing of Anodically and Chemically Polished Pure Aluminum Surfaces.** W. Helling and F. Baumann. *Metall,* v. 6, July 1952, p. 346-350.

Measuring and representation of the polishing effect. Details of the experiments. Diagrams, optical and electron micrographs, and interference patterns. (L12, L13, M27, Al)

**743-L.** (German.) **Treatment of Zinc Waste in Hot-Dip Galvanizing.** R. Haarmann. *Metall,* v. 6, July 1952, p. 363-369.

Possibilities for economizing on Zn consumption. Treatment of Zn residues, melting of Zn beads, treatment of slag, and of hard Zn. Graphs and micrographs. (L16, Zn, CN)

**744-L.** (German.) **The Porosity of "Eloxidized" Layers.** Oswald Kubaschewski and Arvid von Krusenstjern. *Metalloberfläche,* ser. A, v. 6, July 1952, p. A97-A102.

The protective effect of various oxide coatings, and the formation of macropores and micropores in anodizing of pure Al. Various methods for judging the porosity of a layer. Micrographs. (L19, Al)

**745-L.** (German.) **Galvanizing in the United States of America.** *Stahl und Eisen,* v. 72, July 3, 1952, p. 805-833.

Three articles plus accompanying discussion: "Hot Dip Galvanizing of Tubes", Rolf Haarmann; "American Methods of Zinc Coating Steel Wire and Steel-Wire Products", Peter Hillesheim; and "Galvanized Sheet and Strip", by Wilhelm Brachmann. (L16, Zn, CN)

**746-L.** (German.) **Processing and Measuring Methods in the Surface-Finishing Industry.** J. Ickert. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 663-665.

Equipment for electroplating, paint application, roughness and hardness measurement, and automatic flame hardening. 19 ref. (L17, L26, J2, S15, Q29)

**747-L.** (Russian.) **Impregnation of the Surface of Steel by Vanadium From Gaseous Media.** G. N. Dubinin. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 11, 1952, p. 269-272.

Iron (0.03% C) and steel (0.1-1.2% C) were vanadium impregnated by means of $VCl_2$ vapor in a stream of $H_2$ at temperatures from 800 to 1300° C. Results are tabulated, charted, and illustrated. (L15, Fe, CN)

**748-L. Titanium-Dioxide Rectifiers.** *Canadian Chemical Processing,* v. 36, July 1952, p. 72.

By forming a layer of $TiO_2$ on a sheet of Ti and then applying a counterelectrode to the oxide surface, the new rectifiers are prepared. Two processes have been devised to form the oxide layer. One process involves heating the Ti metal first in $O_2$ and then $H_2$. The other consists in heating it in steam at elevated temperatures. (L14, T1, Ti)

**749-L. Aeronautical Ceramics.** Thomas A. Dickinson. *Ceramic Age,* v. 60, July 1952, p. 15-16, 18.

Chiefly methods of application of ceramic coatings to metal. (L27)

**750-L. New Bath Refines Aluminum Uses.** *Chemical Engineering,* v. 59, July 1952, p. 268.

New type of organic plating bath which provides dense, ductile deposits of the metal, suitable for a number of exacting applications not possible before. (L17, Al)

**751-L. Enameling of Aluminum.** C. R. Sigler. *Finish,* v. 9, Aug. 1952, p. 35-37, 56-57.

Previously abstracted from *Ceramic Industry,* item 775-L, 1951. (L27, Al)

**752-L. 4 Times the Life for Shears That Cut Metal 2¾ In. Thick.** *Inco Magazine,* v. 25, no. 3, 1952, p. 10.

Blades were faced with easily deposited alloy (Hastelloy C) that work-hardens in service to increase its wear resistance. (L24, T5, Ni)

**753-L. The Use of Alkalis in Cleaning Processes. Part 2.** P. G. Clements and T. Kennedy. *Industrial Chemist and Chemical Manufacturer,* v. 28, July 1952, p. 301-305.

Effect of alkaline detergents on a wide variety of materials of construction, both metallic and nonmetallic. 13 ref. (L12)

**754-L. Efficiency of Hard Facing Operation Increased by 75%.** *Industry & Welding,* v. 25, Aug. 1952, p. 33-34, 58.

Use and advantages of automatic submerged-arc welding for hard facing coal-crushing equipment, at Cleveland Electric Illuminating Co. A high-alloy electrode is used on 0.45% C steel. (L24, CN)

**755-L. Power Brushing Solves Many Weld Finishing Problems.** *Industry & Welding,* v. 25, Aug. 1952, p. 54-56, 58.

Illustrated examples; selection of correct brush. (L10)

**756-L. Rust Inhibitor Hosed on Large Steel Parts.** *Iron Age,* v. 170, July 31, 1952, p. 98-100.

Prepainting process at Cleveland-Cadillac Tank plant in which a new solvent is used to combine three operations in one to remove grease and tar, clean chips, and produce a rust-inhibitive phosphate coating. (L14, L12, ST)

**757-L. Get More Coverage With Electrostatic Painting.** *Iron Age,* v. 170, Aug. 7, 1952, p. 116-117.

More than three times the number of chairs per gal. of paint is the record of ChromCraft Div., American Fixture & Mfg. Co., St. Louis. Equipment and procedures. (L26)

**758-L. Electrolytic Titanium.** Abner Brenner and Seymour Senderoff. *Journal of the Electrochemical Society,* v. 99, Aug. 1952, p. 223C-224C.

Preliminary findings in the problem of finding an electrolytic method for producing Ti electrodeposits or Ti powder. Micrographs. (L17, H10, Ti)

**759-L. Factors Influencing the Design of Automatic Plating Plant.** A. Smart. *Journal of the Electrodepositors' Technical Society,* v. 27, 1951, p. 277-288; disc., p. 289-291. (Preprint.)

The various steps in the design of one rather large installation for electrogalvanizing steel window frames. (L17, Zn, CN)

**760-L. Hot Dip Galvanizing.** *Metal Industry,* v. 81, July 11, 1952, p. 23-25.

Report on Second International Conference on Hot Dip Galvanizing, Düsseldorf, Germany, comprises two papers accompanying discussion; "The Ductility of Hot Dip Galvanized Coatings", H. Bablik; and "The Flaking of Hot Dipped Zinc Coatings", M. L. Hughes. (L16, Zn, CN)

**761-L. Zinc Coating — Galvanizing Baths.** *Metal Industry,* v. 81, July 18, 1952, p. 51-52.

Second part of report on 2nd International Conference on Hot-Dip Galvanizing, Düsseldorf, Germany. Briefly reports on two papers and accompanying discussion: "The Potential Behaviour of the Iron-Zinc Alloy Layer of Galvanized Steel in Various Hot Aqueous Solutions", R. C. Weast; and "The Effect of Aluminium and Iron on the Structure of Galvanized Coatings", M. A. Haughton. (L16, M27, R5, Zn, CN)

**762-L. The Hardness of Chromate Films; an Investigation of Chromate Passivated Cadmium Plate.** A. J. W. Beck. *Metal Industry,* v. 81, July 25, 1952, p. 69-70. (L14, L17, Cd)

**763-L. Chromium Plating Baths Containing Fluorides or Fluosilicates.** T. A. Hood. *Plating Notes,* v. 4, Apr. 1952, p. 31-45.

Previously abstracted from *Metal Finishing,* item 572-L, 1952. (L17, Cr)

**764-L. Thin Metal Films — New Methods for Their Production.** Richard B. Belser. *Research Engineer* (Georgia Institute of Technology), v. 1, May 1952, p. 7-8, 21-24.

New methods of film-forming and some modern applications using Au, Cu, Sn, Zn, Pd, Pb, Cd, Ag, Pt, Al, Ni, Ti, Zr, Cr, and In. Photomicrographs. (L25)

**765-L. Evaporation of Silver From Electroplated Heating Elements.** Lawrence A. Howard and Charles M. Berntson. *Review of Scientific Instruments,* v. 23, July 1952, p. 383.

A method of holding silver for electrical melting in the evaporation of that metal on surfaces of differing shapes and sizes. (L25, N16, Ag)

**766-L. Automatic Brushing Speeds Gear Cleaning.** *Steel,* v. 131, Aug. 4, 1952, p. 94-95.

Unskilled worker using machine brushing setup keeps up with pace set by modern gear cutters. Gear finishing is stepped up from 20 to 125 per hr. (L10, G17)

**767-L.** (French.) **Electropolishing of Brass.** Jean Daurat. *Métallurgie et la Construction Mécanique,* v. 84, May 1952, p. 363, 365; June 1952, p. 461.

The process, its applications, and measurement of brightness by a reflectometer. (L13, P17, Cu)

**768-L.** (German.) **Instructions for Painting of Aluminum in Shipbuilding.** J. Reiprich. *Aluminium,* v. 28, July-Aug. 1952, p. 248-250. (L26, Al)

**769-L. How to Select Abrasives for Blast Cleaning Metals.** V. F. Stine. *American Foundryman,* v. 22, Aug. 1952, p. 39-41.

Selection of best abrasive considered in terms of four primary factors; type of metal to be cleaned; shape of the part; kind of material to be removed; and surface finish desired. (L10)

**770-L. A Growing Need for Clad Metals Replaces Hand Methods With a Bonding Machine.** *Business Week,* Aug. 16, 1952, p. 61-62, 64, 66.

Economic and technological status of clad metals. Knapp Mills, Inc., Long Island City, N. Y., and American Cladmetals Co., Carnegie, Pa., are the principal producers. Automatic machinery which is giving ten times the output of hand welding-torch methods previously used. (L24)

**771-L. Trifluorochloroethylene Polymer Resin Dispersion Films on Metal.** F. E. Gusmer. *Corrosion* (News Section), v. 8, Aug. 1952, p. 1-2.

Method of surface preparation, application, and testing of this protective coating. Resistance to a variety of common chemicals and to heat was very good. (L26)

**772-L. Barrel Finishing Precision Turbo-Jet Parts.** Dudley J. Kaharl. *Machinery* (American), v. 58, Aug. 1952, p. 145-151.

Procedures and equipment of Pratt & Whitney Aircraft Div., United Aircraft Corp., East Hartford, Conn. Materials are steel, aluminum, stainless steel, brass, and magnesium. (L10, SS, ST, Al, Cu, Mg)

**773-L. Mollerizing Iron and Steel Provides Aluminum Surfaces.** *Machinery* (American), v. 58, Aug. 1952, p. 179-181.

Al can be united permanently with the surfaces of steel or iron parts, regardless of intricate shapes. The process consists of immersing the workpieces in an electrically heated salt-bath furnace after the parts have been thoroughly cleaned and pickled. The bath has a layer of molten Al on top 2-4 in. in depth. When the parts have reached the temperature of the bath, approximately 1500° F., they are held for a short period, then withdrawn through the molten Al and consequently receive a coating of Al on exposed surfaces. (L15, Al, ST, Fe)

**774-L. Rebuilding Engine Cylinders and Liners; Worn Machine Surfaces Built up With Iron and Porous Chromium.** Fred M. Burt. *Metal Finishing,* v. 50, Aug. 1952, p. 67-72.

Use of the "Vanderloy M" Fe plating and "Porus-Krome" processes. Micrographs show structure of the deposits. (L17, Fe, Cr)

**775-L. A Metal Cleaning Test Using Radioactive Stearic Acid as Soil. Part II.** J. W. Hensley, H. A. Skinner, and H. R. Suter. *Metal Finishing,* v. 50, Aug. 1952, p. 77-80, 83.

Test apparatus and procedure. Cleaning test results for removal of stearic acid films from steel, using different agents, are charted and tabulated. (L12, ST)

**776-L. Protecting Metal Surfaces With Paint.** Allen G. Gray. *Metal Progress,* v. 62, Aug. 1952, p. 79-81, 142, 144, 146.

Grit and shot-blasting, wire brushing, flame conditioning, chemical methods, theory of paint protection, effect of electropotential gradients, and selection of pigments. (L26)

**777-L. A New Solution for the Electrolytic Polishing of Copper and Copper-Base Alloys, Particularly Tin Bronze.** E. C. W. Perryman. *Metallurgia,* v. 46, July 1952, p. 55-57.

Addition of concentrated $H_2SO_4$ to the orthophosphoric acid solution normally used is recommended. (L13, Cu)

**778-L. Barrel Finishing. III. Planning a Barrel Finishing Department.** Morris S. Shipley. *Plating,* v. 39, Aug. 1952, p. 860-861.

Includes layout diagrams. (L10)

**779-L. Quantitative Measurement of Adhesion of Electrodeposited Metals.** (Concluded.) H. C. Schlaupitz and W. D. Robertson. *Plating,* v. 39, Aug. 1952, p. 862-864, 932.

Modified nodule method. 18 ref. (L17)

**780-L. Physical Properties of Electrodeposited Metals. I. Nickel. 3. The Effect of Plating Variables on the Structure and Properties of Electrodeposited Nickel.** A. Brenner, Victor Zentner, and C. W. Jennings. *Plating,* v. 39, Aug. 1952, p. 865-894, 899-927, 933.

Main objective was to accumulate data on those mechanical properties of nickel electrodeposits which are of immediate value in engineering applications. A further aim was to collect data on other properties, such as density and electrical, magnetic, and thermal properties, which may be of value in determining the suitability of Ni deposits for special applications. A subsidiary but important purpose was to correlate the physical and mechanical properties of Ni deposits with their conditions of deposition, structure, and chemical composition and to show the correlations existing between the properties themselves. Extensive tabular data, graphs, and micrographs. 209 ref. (L17, Q general, P general, M27, Ni)

**781-L. Neoprene Protective Coatings.** L. S. Blake. *Product Engineering,* v. 23, Aug. 1952, p. 138-139.

Neoprene rubber is now available in room-temperature curing solutions with high solids content. Applications in coatings. (L26)

**782-L. Hard Chromium Coatings for Ferrous Parts.** G. A. Samuel. *Product Engineering,* v. 23, Aug. 1952, p. 164-166.

English process of chromizing consists of placing parts in a carburizing box containing a Cr-rich powder and heating the sealed box in an ordinary furnace for 6-12 hr. Field of application is between those of stainless and plating, and slightly overlaps in each case. (L15, Cr, ST)

**783-L. Some Newer Organic Protective Coatings.** David Busker. *Product Engineering,* v. 23, Aug. 1952, p. 167-174.

Recent developments; outstanding properties of the resin-base finishes; industrial applications; specialty finishes; and strippable films. (L26)

**784-L. High Operating Efficiency in Job Lot Finishing of Small Parts.** Frank L. Bonem. *Products Finishing,* v. 16, Aug. 1952, p. 18-28, 30.

Facilities at Shakeproof, Inc., division of Illinois Tool Works, for finishing of such small parts as gears, screws and other fastening devices. Details of automatic Zn and Cd plating; phosphating; barrel plating with Zn, Cd, and Cu; tinning and miscellaneous finishes; washing; and maintenance and control. Photographs and layout diagram (L general, Zn, Cd, Cu, Sn, Pb)

**785-L. Mica Base Paint System Increases Transformer Tank Life.** J. G. Ford and A. J. Kuti. *Products Finishing,* v. 16, Aug. 1952, p. 30, 32, 34, 36.

Three-coat system as applied at Transformer Division, Westinghouse Electric Corp., Sharon, Pa. (L26, ST)

**786-L. Conservation of Sulfuric Acid and Nickel Sulphate in the Pickling Department.** M. H. Whitehead. *Products Finishing,* v. 16, Aug. 1952, p. 36, 38, 40, 42.

Storage, handling, use, and possible reclaiming methods. Treatment of sheet steel prior to porcelain enameling. (L12, ST)

**787-L. Military Uses of Organic Finishes.** *Products Finishing,* v. 16, Aug. 1952, p. 46, 48, 52, 56, 58, 60, 62, 66, 68.

Report on four talks given before the Lacquer Panel, 63rd Annual Convention, National Paint, Varnish, and Lacquer Association. Requirements of Ordnance and Air Force, tests for military finishes, and a table on properties of aircraft finishes. Photographs. (L26)

**788-L. Electropolishing of Silver Shows Cyclic Behavior.** *Products Finishing,* v. 16, Aug. 1952, p. 68, 72, 74, 78. (From paper by H. T. Francis and W. H. Colner. *Journal of the Electrochemical Society.*)

Effect of voltage regulation on the cycling observed in the anodic electropolishing of silver in cyanide solution. Circuit diagram. (L13, Ag)

**789-L. Plating on Stainless Steel.** *Products Finishing,* v. 16, Aug. 1952, p. 78, 80, 82.

Tentative recommended practices as developed by ASTM Committee B-8 and published in B254-51 T, issued 1951 for various electrodeposits. Covers scale removal, cleaning, and activation. (L17, SS)

**790-L. Chromium-Alloy Coatings.** *Products Finishing,* v. 16, Aug. 1952, p. 82, 84, 86.

Summarizes article by T. P. Hoar and E. A. G. Croom, *Journal of the Iron and Steel Institute,* (item 11-L, 1952); and an article in *Journal of the Electrochemical Society* on salt-bath chromizing studies conducted at Battelle Memorial Institute for the Air Materiel Command. (L15, CN)

**791-L. The Evolution of the Modern Hot-Dip Galvanizing Pot.** Wallace G. Imhoff. *Wire and Wire Products,* v. 27, Aug. 1952, p. 769-774, 828-832.

Various types of pot designs, showing progressive changes down to the present time. Graphs. 32 ref. (L16, Zn)

**792-L. (Book) Elements of Ceramics.** F. H. Norton. 246 pages. 1952. Addison-Wesley Press, Cambridge 42, Mass. $6.50.

Designed to cover the principles underlying the various processes used in the ceramic field, with enough illustrations to make their application clear. Emphasis is placed on unit processes. Includes chapter on enameling of metals; brief mentions of refractories. (L27, B19)

# M

## METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

**303-M. Some Recent Developments in Metallurgical Microscopy.** R. C. Gifkins. *Australasian Engineer,* May 7, 1952, p. 63-70.

Equipment, procedures, and typical results. 30 ref. (M21)

**304-M. X-Ray Investigation of the Epsilon Phase in an Fe-Mn Alloy.** J. Gordon Parr. *Journal of the Iron and Steel Institute* v. 171, June 1952, p. 137-141.

X-ray investigation of alloy containing 18.5% Mn confirms that the $\varepsilon$ phase has a close-packed hexagonal structure, but refutes a previously assumed crystallographic relationship between the $\gamma$ and $\varepsilon$ phases. Relative amounts of the $\alpha$, $\gamma$, and $\varepsilon$ solid solutions in heat treated powder specimens were determined by an X-ray method, and led to the conclusion that the $\varepsilon$ phase is produced by a process of athermal nucleation, not an equilibrium phase. Tables, graph. 14 ref. (M26, N2, Fe)

**305-M. A Weissenberg X-Ray Diffraction Camera.** C. A. Beevers. *Journal of Scientific Instruments,* v. 29, July 1952, p. 230-232.

A camera suitable for Weissenberg and other types of X-ray diffraction photographs. The special features are its simple and substantial construction, and the large diameter of filmholder and consequent large size of the photograph. The distance from focal spot to crystal is 100 mm. and thus exposure times are particularly short. (M22)

**306-M. An Adjustable Debye-Scherrer X-Ray Camera for Specimens of Large Diameter.** A. Taylor. *Journal of Scientific Instruments,* v. 29, July 1952, p. 236.

Two techniques, one for specimens up to ½ in., and the other, up to ¾ in. diam. Diagrams. (M22)

**307-M. Modified Picral for Higher Alloy Steels.** A. E. Nehrenberg. *Metal Progress,* v. 62, July 1952, p. 91-92.

Experiences in use of picral solution modified by addition of HCl. Photomicrographs of etched stainless steel. (M21, SS)

**308-M. The Unit Cell and Brillouin Zones of $Ni_4 Mn_{11} Al_{60}$ and Related Compounds.** Keith Robinson. *Philosophical Magazine,* ser. 7, v. 43, July 1952, p. 775-782.

Tables, graphs. 10 ref. (M26, Ni, Mn, Al)

**309-M. Influence of the Apparatus Function on Crystallite Size Determinations With Geiger Counter Spectrometers.** F. R. L. Schoening, J. N. van Niekerk, and R. A. W. Haul. *Proceedings of the Physical Society,* sec. B, v. 65, July 1, 1952, p. 528-535.

A brief survey of the various methods used for determining crystallite sizes from X-ray-diffraction line broadening. Experiments illustrate the effect of sample preparation, absorption, etc., on measurements of line breadth. Graphs. 19 ref. (M22)

**310-M. Imperfections in Nearly Perfect Crystals: A Synthesis.** Frederick Seitz. "Imperfections in Nearly Perfect Crystals", (John Wiley & Sons, New York), 1952, p. 3-76.

There are six primary types of crystal imperfections: phonons, electrons and holes, excitons, vacant lattice sites and interstitial atoms, foreign atoms in either interstitial or substitutional position, and dislocations. In addition to the primary imperfections, there are three transient imperfections: light quanta, charged radiations and uncharged radiations. Available experimental information concerning the interaction of imperfections is classified. Emphasis is placed both on individual characteristics of imperfections and on means by which they are generated. Numerous references. (M26)

**311-M. On the Geometry of Dislocations.** W. T. Read, Jr. and W. Shockley. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 77-94.

Dislocations are one of the few types of defects which naturally occur in crystalline substances. All dislocation types are classified according to a simple scheme which makes use of the Burgers circuit and the Burgers vector. Both complete and partial dislocations are considered. Slipping and diffusive motions of dislocations are illustrated, and a dislocation theory of straight vs. wavy slip bands is suggested. The intersection of dislocations is shown to result in kinks or jogs in the dislocation lines which impede the slipping motions and may create vacancies and interstitial atoms. The Frank-Read mechanism of dislocation multiplication is reviewed. (M26)

**312-M. Imperfections From Transformation and Deformation.** C. S. Barrett. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 97-125, disc., p. 126-128.

Stacking faults (twin faults) can be detected and analyzed by diffraction patterns made with polycrystalline metals oscillating through small angles; line broadening in powder patterns can also be used. Plastic deformation causes faulting in certain Cu-Si, Au-Cd, Ag-Sn, and Ag-Sb alloys, and perhaps also in Cu-Zn alloys (possibly also in Cu and Ag at low temperatures), but not in Al or 24S-T Al alloy. The faulting that accompanies transformation in Co, Li, and Li-Mg is ascribed to strains of the martensitic-type transformation. Other distortions connected with plastic flow are enumerated. 45 ref. (M26, N9, Q24)

**313-M. Experimental Information on Slip Lines.** W. T. Read, Jr. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 129-146; disc., p. 146-151.

A brief review of experimental information, no attempt being made at interpretation. For the most part, the results refer only to metal single crystals; the various metals are considered one after another. Investigations reported were on slip direction and slip plane, form of the slip lines, spacing of the various classes of slip lines, and amount of slip per line. Techniques for study of influence of experimental conditions on slip lines. 38 ref. (M26, Q24)

**314-M. Substructures in Crystals.** A. Guinier. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 402-436; disc., p. 436-440.

Sub-boundaries divide crystalline grains into smaller elements, called subgrains, which are slightly disoriented. They are revealed with the optical or electron microscope by special etching reagents or by their property of favoring the formation of precipitates in supersaturated solid solutions or collection of impurities. Sensitive X-ray techniques give relative orientations of the subgrains. Techniques and typical observations on various metals, alloys, and nonmetallic crystals. 43 ref. (M26)

**315-M. The Properties and Effects of Grain Boundaries.** Bruce Chalmers. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 441-450; disc., p. 450.

A distinction is made between properties and the effects of grain boundaries; effects of boundaries on plastic deformation; possibility of a noncrystallographic mode of deformation. Strength (shear and normal) and fusion (chemical and electrochemical). 19 ref. (M27, Q24)

**316-M.** (French.) **Micrographic Determination of the Grain Size of Aluminum and Its Alloys.** Jean Hérenguel: *Revue de l'Aluminium,* v. 29, June 1952, p. 221-229.

Application to Al and its alloys of methods of intergranular attack and grain orientation for determination of grain size. Typical micrographs. 11 ref. (M27, Al)

**317-M.** (French.) **The Fine Structure of Bragg Reflections, and Imperfections in Metallic Crystals.** Honoré Lambot and Lawrence Vassamillet. *Revue de Métallurgie,* v. 49, June 1952, p. 408-410.

Proposes a simple method for obtaining images of crystal defects, using monochromatic radiation. Details of the investigation. Micrographs. (M26)

**318-M.** (German.) **Operation and Possibilities of Application of the Field Electron Microscope in Metallurgy.** M. Drechsler and E. W. Moller. *Metall,* v. 6, July 1952, p. 341-345.

Possibility of obtaining micrographs showing course of chemical reactions taking place in the upper monomolecular adsorption layer. Various examples, such as investigations on self-diffusion processes, adsorption, reactions on metal surfaces, and diffusion of carbon. Diagrams and micrographs. 10 ref. (M21, N1)

**319-M.** (German.) **Investigations on Segregations in Superhard MgAl Malleable Alloys.** W. Mannchen. *Metall,* v. 6, July 1952, p. 360-362.

Experiments on Mg alloy containing 7% Al, 1% Zn, 0.1% Mn, to determine the percentage of segregations, their number, and their mean absolute surface. Results are tabulated and charted. (M28, Mg)

**320-M.** (French.) **Data on the Diffusion of Small-Angle X-Rays by the Structure of Age Hardened Alloys. Case of Aluminum-Silver Alloys.** A. Guinier. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 217-223.

The origin of such diffusion, with special emphasis on defective crystals. Annealing at high and at low temperatures. Graphs and micrographs. 16 ref. (M22, Al, Ag)

**321-M. The Metallographic Preparation of Porous and Friable Coatings.** D. Caplan and P. E. Beaubien. *Canadian Journal of Technology,* v. 30, July-Aug. 1952, p. 211-213.

During the metallographic examination of the scale layers on heat resistant alloys, great difficulty was experienced in preparing polished cross-sections because of the tendency of the porous and fragile oxide layers to disintegrate during cutting, mounting, grinding, and polishing. The usual method of mounting in plastic by pressure molding not only crushed the layers but did not permit the supporting plastic to enter into the interstices. A double vacuum-impregnation technique using two liquid plastics gave satisfactory results. (M21, R2)

**322-M. Develop New Technique for Metal Structure Study.** R. B. Pond and N. K. Chen. *Iron Age,* v. 170, Aug. 7, 1952, p. 122-126.

Motion-micro study, an unusual technique developed at Johns Hopkins University. A motion picture camera hooked to a microscope was used to take pictures of liquid-solid transformations of low-melting-point alloys. A special micro-tensile testing machine, equipped with strain gages and Dynalog recorder, was developed to deform and measure the extent of strain. This combination setup was used to study plastic deformation of high-purity Al crystals grown by gradual solidification from the liquid metal. (M23, Q24, Al)

**323-M. Specimen Charging in the Electron Microscope and Some Observations on the Size of Polystyrene Latex Particles.** S. G. Ellis. *Journal of Applied Physics,* v. 23, July 1952, p. 728-732.

From observations in the shadow electron microscope and the standard electron microscope, it is concluded that specimen charging does not significantly change the magnification of the latter, provided that the specimen is less than a few microns in thickness and that the illuminating electron beam simultaneously strikes a nearby grounded conductor such as the supporting mesh. The difference in size of shadowed and unshadowed Dow Latex 580G, Lot 3584, reported by Kern and Kern, is attributed to an added layer of material on the shadowed particles. Evidence in support of this view and results of other workers. (M21)

**324-M. The Reliability of Internal Standards for Calibrating Electron Microscopes.** John H. L. Watson and William L. Grube. *Journal of Applied Physics,* v. 23, July 1952, p. 793-798.

Particles of Dow Latex 580G are unstable under electron beams and best micrographed at low intensity. Two different effects of radiation are noted. 580G is improved as an internal standard if recalibrated by some other suitable standard each time before use. Fresh replicas of diffraction gratings are still the most practical standards, reproducing gratings of 2%. A reliable method of calibration using 580G is suggested. (M21)

**325-M. The Constitution of Nickel-Rich Alloys of the Nickel-Chromium-Titanium System.** A. Taylor and R. W.

Floyd. *Journal of the Institute of Metals,* v. 80, July 1952, p. 577-587.

The binary Ni-Cr and Ni-Ti systems were re-examined by X-ray diffraction and micrographic techniques, and new equilibrium diagrams for them are presented. A detailed investigation was also carried out on Ni-rich Ni-Cr-Ti alloys from which partial equilibrium diagrams corresponding to the 750, 1000, and 1150° C. isothermals were constructed. The boundary separating magnetic from nonmagnetic ternary $\gamma$-phase alloys at 20° C. is indicated in the equilibrium diagram. 37 ref. (M24, Ni, Cr)

**326-M. The Constitutional Diagram of the Chromium-Tungsten System.** H. T. Greenaway. *Journal of the Institute of Metals,* v. 80, July 1952, p. 589-592.

Investigated by metallographic, X-ray, and thermal analysis. The liquidus rises, slowly at first and then more rapidly, from the freezing point of Cr toward that of W. Above 1500° C., the solid alloys consist of a continuous series of solid solutions; below 1500° C., the single phase breaks down into two limited solid solutions, which thus form a solubility gap in the diagram. (M24, Cr, W)

**327-M. Lattice-Spacing Relationships in Aluminium-Rich Solid Solutions of the Aluminium-Magnesium and Aluminium-Magnesium-Copper Systems.** D. M. Poole and H. J. Axon. *Journal of the Institute of Metals,* v. 80, July 1952, p. 599-604.

Two samples of Mg of different purities were used. Increasing the purity of the Mg reduces curvature of the relationship at low concentrations of Mg and causes the linear portion of the curve to become more steep. The Al-rich Al-Mg-Cu solid solution was also investigated, using Mg of high purity. 11 ref. (M26, Al)

**328-M. Factors Affecting Equilibrium in Certain Aluminium Alloys.** E. C. Ellwood. *Journal of the Institute of Metals,* v. 80, July 1952, p. 605-608.

Lattice spacings and densities of solid solutions of Cu, Mg, and Ag in Al were measured at 25° C. No anomalies were found in the Al-Cu solution. In the Al-Mg solution, the slight curvature in the lattice-spacing-composition curve reported by Axon and Hume-Rothery is confirmed, and vacant sites are formed in the solid solution. It is deduced that anomalies are the result of Brillouin-zone overlaps. (M26, Al)

**329-M. The Factors Affecting the Formation of 21/13 Electron Compounds in Alloys of Copper and of Silver.** W. Hume-Rothery, J. O. Betterton, and J. Reynolds. *Journal of the Institute of Metals,* v. 80, July 1952, p. 609-616.

An attempt was made to discover the factors that control the composition limits of phases with the $\gamma$-brass structure in different alloy systems. The Brillouin zone of the structure is described. Data for Cu-Al and Cu-Ga alloys show that, when the electron concentration reaches about 1.70, atoms begin to drop out of the structure in such a way that the number of electrons per unit cell remains constant. The data for all the systems indicate that this is a critical electron concentration beyond which a normal structure with its full complement of atoms cannot exist. 19 ref. (M25, Cu, Ag)

**330-M. The Lattice Spacings and Densities of Gold-Nickel Alloys at 25° C.** E. C. Ellwood and K. Q. Bagley. *Journal of the Institute of Metals,* v. 80, July 1952, p. 617-619.

Anomalies in lattice spacing and density were found in the solid solutions of Au and Ni. It is concluded that Brillouin-zone overlaps occur in the solid solution, accompanied by formation of vacant lattice sites. By analogy with other Au-rich solid solutions and from the calculation by Jones and Mott of the N(E) curve for the face-centered-cubic metal Cu, it is concluded that Ni has a valency of 3.2 when dissolved in Au up to 60 at. -%. (M26, P10, Au, Ni)

**331-M. Microstructural Changes in the High-Alloy Valve Steel XCR.** B. Cina. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 229-237.

To study the complex diffusion processes involved in the approach to equilibrium of a Cr-Ni-Mo-C valve steel at temperatures up to 1150° C., the microstructural changes produced by heat treatment at several temperatures were studied at room temperature by optical microscopy, X-ray diffraction, and hardness determinations, and a correlation found between results obtained by the three methods. Tables and four pages of photomicrographs. 15 ref. (M21, M22, M23, SS)

**332-M. A New Device for Metallic Shadow-Casting.** Tadatosi Hibi. *Review of Scientific Instruments,* v. 23, July 1952, p. 383-385.

A new device for metallic shadow-casting by using a nozzle system is proposed, and an outline of the apparatus is shown. Advantages of this system. Photomicrographs. (M23)

**333-M. Microscopic Studies of Tungsten Wire.** Robert B. Reid. *Sylvania Technologist,* v. 5, July 1952, p. 75-76.

Photomicrographs show the effects of fissures and advanced grain growth in tungsten wire and the contamination of tungsten filaments due to contact with metal or lubricating-oil vapor. (M27, W)

**334-M. (English.) The Structure of $\beta$ (AlMnSi)-$Mn_3SiAl_9$.** Keith Robinson. *Acta Crystallographica,* v. 5, July 1952, p. 397-403.

X-ray examination of single crystals of ternary compounds occurring in the Al-Mn-Si system forms part of the research of structural work on Al-rich intermetallic compounds, being carried out in conjunction with the metallographic examination of alloys by the University of Birmingham, England. Tables and graphs. 15 ref. (M26, Al, Mn, Si)

**335-M. (English.) The Iron-Nitrogen System: The Crystal Structures of $\varepsilon$-Phase Iron Nitrides.** K. H. Jack. *Acta Crystallographica,* v. 5, July 1952, p. 404-411.

Part of a chemical and structural investigation of binary and ternary interstitial alloys of Fe, C, and $N_2$. 15 ref. (M26, Fe)

**336-M. (English.) A Device for Calculating Structure Factors.** W. L. Bragg. *Acta Crystallographica,* v. 5, July 1952, p. 474-475.

Device consists of dials on a pivoted table which are set to create moments proportional to the terms, and the sum is obtained by restoring the balance with an applied torque. (M23)

**337-M. (English.) On the Relations Between Fourier and Least-Squares Methods of Structure Determination.** D. W. J. Cruickshank. *Acta Crystallographica,* v. 5, July 1952, p. 511-518.

A criterion for determining atomic coordinates in the Fourier method, applicable to resolved or unresolved peaks, is introduced. A criterion for finding atomic coordinates from the Patterson density leads to refinement equations which are similar to the normal equations. Both centrosymmetric and non-centrosymmetric space groups are considered. Approximate forms of the equations and the relationship of this work to earlier work by Booth, Cochran, and Cruickshank. (M22)

**338-M. (English.) Tables of Absorption Factors for Spherical Crystals.** H. T. Evans, Jr. and Miriam G. Ekstein. *Acta Crystallographica,* v. 5, July 1952, p. 540-542.

Tables give the absorption factor in terms of two variables. The tables are analogous to the standard ones for cylinders. (M26)

**339-M. (English.) The Diffraction of X-Rays by a Random Assemblage of Molecules Having Partial Alignment.** Herbert D. Deas. *Acta Crystallographica,* v. 5, July 1952, p. 542-546.

The medium considered consists of molecules or other like particles. The intensity distribution for X-ray diffraction is expressed in Fourier space in terms of the intensity distribution (Patterson transform) of the single molecule. Two examples are given, one of which contains, as a special case, the previously determined effect of finite linear gratings in random orientation. (M22)

**340-M. (English.) A Graphical Method for Applying Harker-Kasper Inequalities to Structure Determination.** Kiichi Sakurai. *Acta Crystallographica,* v. 5, July 1952, p. 546-548.

Details of calculations and graphical interpretation of the method. (M22)

**341-M. (English.) The Habit Plane of the Zirconium Transformation.** A. J. J. van Ginneken and W. G. Burgers. *Acta Crystallographica,* v. 5, July 1952, p. 548-549.

Results of investigation. (M26, Zr)

**342-M. (English.) Some Theoretical Aspects About the Second Order Superlattice in Body Centered Cubic Lattice.** Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 24-33. (M26)

**343-M. (English.) Research on the Copper-Rich Solid Solution in Cu-Mn Binary System. I.** Masayuki Kawasaki, Kenkichi Yamaji, and Osamu Izumi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 66-77.

Alloys in Cu-Mn system containing up to 61.3% Mn were investigated from various standpoints, namely microstructure, hardness changes due to various heat treatments, temperature dependence of electric resistivity and thermal expansion, and density at room temperature. (M24, Cu, Mn)

**344-M. (English.) On the Equilibrium Diagram of Iron-Manganese System.** Hiroshi Yoshisaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 137-150.

Study was carried out with alloys containing 50-100% Mn, by means of measurements of thermal expansion, magnetic analysis, microscopic examination, and X-ray examination. Numerous micrographs. (M24, Fe, Mn)

**345-M. (English.) On the Liquidus Line of Fe-Mn Alloys.** Mitsutake Isobe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 151-154.

Equilibrium diagram of Fe-Mn alloys containing more than 50% Mn was studied by means of thermal analysis. Tables, graphs, and discussion. (M24, Fe, Mn)

**346-M. (French.) Orientation Relationships Between Cementite and $\alpha$-Iron.** J. J. Trillat and S. Oketani. *Acta Crystallographica,* v. 5, July 1952, p. 469-471.

Single-crystal films of $\alpha$-Fe were formed by evaporation onto a cleavage face of NaCl heated to 600-700° C. followed by annealing at 700° C. Preparations of $\alpha$-Fe were carburized at 500° C. in an atmosphere of Co + $H_2$ and then examined by electron diffraction. 12 ref. (M27, Fe)

**347-M.** (French.) **Unidimensional Disorder in SiC and Its Influence on the Diffraction Intensity of X-Rays.** R. Gevers. *Acta Crystallographica,* v. 5, July 1952, p. 518-524.

Theory is developed for the X-ray scattering by SiC crystals of the usual 4, 6 and 15-layer types, which show order in two translation directions but disorder in the third direction. (M22, Si, C-n)

**348-M.** (French.) **The Existence of a New Phase in Chromium-Molybdenum Steel.** L. Habraken. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 281-284.

Details of investigation. Role of this phase in creep resistance at elevated temperatures.
(M26, Q3, SS)

**349-M.** (Spanish.) **New Possibilities of Macro and Microphotography in Welding Investigation.** Felipe A. Calvo. *Ciencia y Téchnica de la Soldadura,* v. 1, Nov.-Dec. 1951, 6 pages.

Methods using both oblique and reflected illumination. (M21)

**350-M. Effect of Cr on Eutectoid Carbon.** H. S. Blumberg. *Metal Progress,* v. 62, Aug. 1952, p. 93.

Proposes a simple empirical formula which approximates the values reported by various investigators. Calculated results from this formula and data shown by various authorities are tabulated. (M27, AY, SS)

**351-M. Discard This Etchant Promptly.** L. H. Satz. *Metal Progress,* v. 62, Aug. 1952, p. 96.

Recommends discarding of the "mixed acids in glycerol' etchant of stainless steels soon after preparation. On standing for extended periods a dangerous exothermic reaction takes place. (M21, SS)

**352-M. Ni-Cr-Fe Ternary Diagrams.** *Metal Progress,* v. 62, Aug. 1952, p. 96-B.

Data sheet. Diagrams for six temperatures. (M24, Ni, Cr, Fe)

**353-M.** (English.) **Compounds of Thorium With Transition Metals. I. The Thorium-Manganese System.** John V. Florio, R. E. Rundle, and A. I. Snow. *Acta Crystallographica,* v. 5, July 1952, p. 449-457.

Previously abstracted from *U. S. Atomic Energy Commission,* AECD-3249, Aug. 24, 1951. See item 65-M, 1952. (M24, Th, Mn)

**354-M.** (Book) **Imperfections in Nearly Perfect Crystals.** W. Shockley, J. H. Hollomon, R. Maurer, and F. Seitz, editors. 490 pages. 1950. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.50.

Symposium held at Pocono Manor, Pa., Oct. 12-14, 1950, to present a cross-section of views and findings on imperfect crystals. The important parts of papers and discussions are summarized in 17 chapters, divided into 4 parts: On the Nature of Imperfections in Nearly Perfect Crystals; The Role of Imperfections in Deformation; Diffusion and Related Phenomena; and Properties and Effects of External and Internal Surfaces of Crystals. Selected papers are separately abstracted.
(M 26, N general, Q24)

**355-M.** (Book) **Polarized Light in Metallography.** G. K. T. Conn and F. J. Bradshaw. 130 pages. 1952. Academic Press, Inc., 125 E. 23rd St., New York 10, N. Y. $3.80.

First part deals with optical principles, equipment and procedure. Second part gives many examples of the uses to which the technique has been put. Alloy phase identification, orientation studies, and ore and inclusion analysis. (M21)

**356-M.** (Book) **Steel Defects and Their Detection.** Henry Thompson. 84 pages. 1952. Sir Isaac Pitman & Sons, Ltd., 39 Parker St., Kingsway, London W.C. 2, England. 15s.

The first three chapters deal briefly with steel ingots and the more common defects associated with ingots and the rolling processes. Two chapters give details of macroscopic and microscopic tests. Hints on the preparation of micro-specimens, and a list of special etching reagents. Special tests such as non-destructive methods of flaw detection, sorting of mixed steels, and the McQuaid-Ehn grain-size test.
(M27, M28, S10, S13, ST)

# N

## TRANSFORMATIONS AND RESULTING STRUCTURES

**225-N. The Theory of Precipitation Hardening.** R. L. Apps. *Journal of the Birmingham Metallurgical Society,* v. 32, June 1952, p. 60-72.

Qualitative review illustrated with diagrams. 18 ref. (N7)

**226-N. Transformations in Copper Alloys.** *Metal Progress,* v. 62, July 1952, p. 150, 152. (Condensed from "Thermo-Elastic Analysis of Transformations in Copper Alloys", R. Cabarat, P. Gence, L. Guillet, and R. LeRoux.)

Previously abstracted from *Journal of the Institute of Metals.* See item 209-N, 1952. (N6, Q21, Cu)

**227-N. Related Diffusion Effects of Carbon and Sulphur in Iron at High Temperatures.** K. J. Irvine. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 142-147.

Experiments on the penetration of iron sulfide into Armco iron in CO, $H_2$, or $N_2$ atmospheres at 1000°; similar experiments with Ni, Cu, Monel metal, and plain carbon steel; and experiments on the relative movement of C and S at high temperatures. The last tests involved carbon steel in CO and in $N_2$; and free-cutting steel in $N_2$. The melting of large sulfide particles is considered. Comparison with earlier results and industrial implications. Photomicrographs. (N1, P12, Fe, Ni, Cu, CN)

**228-N. Effects Associated With the Flow of Vacancies in Intermetallic Diffusion.** R. S. Barnes. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 512-525.

Experiments on the interdiffusion of alpha brass and Cu-Ni couples and sandwiches have shown that there is an increase of volume in the diffusion zone as a result of diffusion. A theory is postulated to explain the volume increase. Tables and diagrams. (N1, Cu, Ni)

**229-N. Diffusion in Alloys and the Kirkendall Effect.** J. Bardeen and C. Herring. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 261-288.

The phenomenological theory of diffusion in a two-component system is formulated more rigorously than heretofore, and it is shown that diffusion currents due to a composition gradient can always be described in terms of two effective diffusion constants, one for each component, provided lattice defects remain everywhere in equilibrium. The detailed atomic mechanism of transport is considered for the special case of diffusion by lattice vacancies. Effectiveness of dislocations in holding the vacancy concentration at its equilibrium value, and some suggestions regarding atomic nature of the plastic flow which takes place in the Kirkendall effect. (N1)

**230-N. Theory of Diffusion.** Clarence Zener. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 289-314.

Refers to solid-state diffusion. The magnitude of $D_o$ for chemical diffusion indicates whether the elementary act of diffusion occurs homogeneously throughout the matrix or is confined to short-circuiting paths arising from imperfections. The frequently found abnormally low $D_o$ in chemical diffusion is attributed to short-circuiting diffusion paths either along grain boundaries or along a continuous network of solute atoms. Conditions under which $D_o$ should have a normal order of magnitude. 44 ref. (N1)

**231-N. Movement and Diffusion Phenomena in Grain Boundaries.** R. Smoluchowski. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 451-471; disc., 472-475.

Experimental data for Ag, Al, and brass are in agreement with theoretical calculations of mobility due to surface tension in a curved boundary. Physical factors such as surface energy, state of strain, external stresses, time and temperature, and relative orientation, and their influence on the mobility of grain boundaries. Thickness of specimen and grain size, together with influence of obstacles and impurities on mobility of grain boundaries. Mechanism of grain-boundary diffusion from the point of view of current theories of volume diffusion. The experimental results, and their interpretation. Influence of relative orientation of grains and grain boundary on diffusion. 30 ref.
(N1)

**232-N.** (French.) **Refining and Tempering of 4% Al-Cu, Al-Cu-Mg, and Al-Cu-Mg-Si High-Purity Alloys.** A. Saulnier and R. Syre. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 1-19; disc., p. 20-21.

Structural hardening with respect to theories of precipitation, objections to these theories, isothermal hardening of high purity 4% Al-Cu alloys, isothermal expansion, influence of Mg on Al-Cu alloys, hardening of Al-Cu-Mg alloys, etc. Micrographs, tables, and graphs. 23 ref.
(N7, J27, Al)

**233-N.** (French.) **Study of the Recrystalization of Three High-Purity Aluminums With the Aid of Their Mechanical Properties.** B. Nauton. *Revue de Métallurgie,* v. 49, June 1952, p. 453-457.

Influence of minute traces of impurities on the temperature of recrystalization. Experimental details. Tables, charts, and micrographs.
(N5, Q general, Al)

**234-N. Age Hardening of Aluminum-Silver Alloys. I. Measurement of Hardness and the Limit of Elasticity.** Werner Köster and Franz Braumann. **II. Measurement of Electric Conductivity and Thermoelectric Force.** Werner Köster, Horst Steinert, and Johannes Scherb. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 193-207.

Part I: Hardness and elasticity of 6, 10, 20, and 38% Ag. Establishment of a metastable balance in cold hardening. The influence of quenching stresses on the kinetics of age hardening and its retrogression. Part II: Effect of time on electric conductivity and thermo-electric force of an alloy containing 38% Ag. Data are tabulated and charted. 40 ref. (N7, Q21, Q29, P15, Al, Ag)

**235-N.** (German.) **Kinetics of the Age Hardening of Aluminum-Silver Alloys. III. Radiographic Investigation of the Age Hardening Process.** Richard Glockner, Werner Köster, Johannes Scherb, and Günther Ziegler. **IV. The**

**Atomic Arrangement in Interference Regions of an Age Hardened Aluminum-Silver Alloy.** Günther Ziegler. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 208-216.

Part III: Radiographic investigations on an Al-Ag alloy containing 38% Ag. Purpose of investigations was to coordinate the occurrence of Guinier-Preston bands with kinetic curves. Experimental details. Results are tabulated and illustrated by radiographs. Part IV: Atomic arrangement in agreement with lattice structure appearing in radiographs of the initial stages of age hardening of Al-Ag alloys at low temperatures. Diagrams. 28 ref.
(N7, P10, Al, Ag)

**236-N.** (German.) **Thermodynamics of Cold Age Hardening.** Ulrich Dehlinger and Helmut Knapp. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 223-227.

The complex conditions arising in supersaturated mixed metallic crystals. Treats particularly negative diffusion and the problem of thermodynamic instability. Theoretical and mathematical. 10 ref. (N1, P12)

**237-N.** (German.) **Investigation on the Disintegration of Potassium Chloride Sodium Chloride Mixed Crystals.** Erich Scheil and Hans Stadelmaier. *Zeitschrift für Metallkunde,* v. 43, June 1952, p. 227-236.

The production of salt crystals, and measurement of their clouding during disintegration. Dependance of the clouding constant on wave length. Phenomena of disintegration of above crystals compared to similar phenomenon in alloys. Graphs and diagrams. 18 ref. (N12)

**238-N.** (Russian.) **Calculation of the Rate of Growth of Nuclei of New Phases During Phase Transformation in a Single-Component System.** B. Ia. Liubov. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 11, 1952, p. 277-279.

Mathematical analysis and graphical interpretation. (N2)

**239-N. On Diffusionless Transformation in Au-Cd Single Crystals Containing 47.5 Atomic Percent Cadmium: Characteristics of Single-Interface Transformation.** Lo-Ching Chang. *Journal of Applied Physics,* v. 23, July 1952, p. 725-728.

Kinetics of single-interface motion. Tables and graphs. (N1, Au, Cd)

**240-N. Grain Boundary Diffusion of Zinc in Copper.** R. Flanagan and R. Smoluchowski. *Journal of Applied Physics,* v. 23, July 1952, p. 785-787.

In continuation of a previous study of grain-boundary diffusion of Ag in Cu, the diffusion of Zn along grain boundaries of columnar Cu was investigated at various temperatures. Results confirm the influence of angle between the grains on diffusion and indicate an angular dependence of activation energy.
(N1, Zn, Cu)

**241-N. A Note on the Formation of Undercooled Graphite in High-Purity Iron-Carbon-Silicon Alloys.** W. S. Owen. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 237-238.

Formation of undercooled graphite in vacuum-melted high-purity Fe-C-Si alloys is a result of the decomposition of an undercooled austenite-carbide complex. Explanation of the phenomena is suggested in general terms. Photomicrographs.
(N8, Fe, CI)

**242-N. A Mechanism for Sputtering in the High Vacuum Based Upon the Theory of Neutron Cooling.** Frank Keywell. *Physical Review,* ser. 2, v. 87, July 1, 1952, p. 160-161.

A Phillips ion-gage discharge was used as a source of ions to measure absolute sputtering ratios (number of atoms sputtered per incident ion) for Ag metal bombarded by ions. Mechanism and circuit diagram of apparatus. (N15, Ag)

**243-N.** (English.) **On the Lattice Vibrations of a Binary Superlattice Alloy.** Yoshio Shibuya, Yoshiichi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 1-12.

Results of a theoretical calculation of the vibrational modes of a $\beta$-brass alloy (Cu-Zn) for the state of any degree of order in accordance with the method of Born and von Karman. The 6th order secular equation obtained was solved with respect to the three principal directions (100), (110), and (111). The $\nu$-$\sigma$ curves for the state of several specified values of degree of order in the three principal directions are plotted. (N10, Cu, Zn)

**244-N.** (English.) **The Behaviours of Fe-Al, Fe-Si and Fe-Al-Si Alloys Considered from the Standpoint of Ferromagnetic Superlattice. I. On the Superlattice Formation in Fe-Al Alloys.** Hiroshi Sato. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 13-23.

Anomalous properties in superlattice formation in solid solutions of Fe-Al system were theoretically deduced by taking into account the interrelation between formation of ordered atomic arrangement and origination of spontaneous magnetization. The phase diagram for superlattice formation in these binary alloys was also reviewed from this general point of view.
(N10, P16, Fe, Al, Si)

**245-N.** (English.) **Study on the Superlattices of Ternary Alloys by X-Ray.** Shiro Ogawa and Yoshinobu Matsuzaki. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 50-54.

The ternary system Fe-Al-Si, which contains the industrially important ferromagnetic alloy "Sendust" and has two superlattices of the same type on the Fe-Al and Fe-Si sides; and offers various problems in connection with superlattice theory. The composition range in which the superlattice of the 3:1 type can exist was investigated. The results showed that all ferromagnetic singularities were found in this composition range.
(N10, P16, Fe, Al, Si, SG-n, p)

**246-N.** (English.) **On the Magnetometric Studies of Transformation in Pure Manganese.** Mitsutake Isobe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 78-81.

Transformation points in pure distilled Mn were magnetometrically investigated by the modified Weiss method. It was found that the Mn had four phases, $\alpha$, $\beta$, $\gamma$ and $\delta$, in the solid state; and that the three transformation points were 702, 1065, and 1138° C., respectively. The behaviors of these transformations were also clarified. (N6, Mn)

**247-N.** (English.) **On the Production of Single Crystals of Zinc, Bismuth and Tin by Sucking up From Their Melts.** Mikio Yamamoto and Jiro Watanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 165-174.

Effect of growing conditions upon percentage of success and orientations of single crystals produced.
(N12, Zn, Bi, Sn)

**248-N.** (French.) **The Phenomenon of Pre-Precipitation in Aluminum-Silver Alloy.** Christopher B. Walker and André Guinier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 9, 1952, p. 2379-2381.

Proposes a new and more accurate model for interpretation of Al-Ag alloys in their first stage of aging. Diffusion diagrams at various annealing temperatures. (N7, Al, Ag)

# P

## PHYSICAL PROPERTIES AND TEST METHODS

**427-P. Heterogeneity of Metal Surfaces.** M. Boudart. *Journal of the American Chemical Society,* v. 74, July 20, 1952, p. 3556-3561.

Some consequences of induction in connection with problems in chemisorption and catalysis. The nature of "active centers" on a metal surface. 39 ref. (P13)

**428-P. The Heats of Combustion of Thorium and Uranium.** Elmer J. Huber, Jr., Charles T. Holley, Jr., and E. H. Meierkord. *Journal of the American Chemical Society,* v. 74, July 5, 1952, p. 3406-3408.

Precise measurements of the heats of combustion of Th, U, and $UO_2$ were made and, from the results, heats of formation of $ThO_2$, $UO_2$, and $U_3O_8$ were calculated.
(P12, Th, U)

**429-P. The Grain Boundary Energy, Its Measurement and Influence Upon the Properties of Metals and Alloys.** T. B. Massalski. *Journal of the Birmingham Metallurgical Society,* v. 32, June 1952, p. 38-59.

Experimental and theoretical evidence referring to origins, variation, and action of the energy associated with various grain boundaries and surfaces. Theories of the nature of the grain-boundary structure. Diagrams and graphs. 27 ref. (P12, M27)

**430-P. Magnetostriction of Some Ferromagnetic Alloys.** E. W. Lee. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 160-164.

A simple apparatus which comprises a double roller and mirror system is capable of giving accurate measurements of magnetostriction of ferromagnetic rods. The apparatus was used to study the magnetostriction of some alloys, including the Ni-Co system. Temperature coefficients of magnetostriction of four Ni alloys were measured. Data are given for Co, 4 Ni-Fe alloys; 2 Ni-Si alloys; Monel; Mangonic; and 8 Ni-Co alloys. Apparatus diagram and graphs. 15 ref.
(P16, Ni, Co, Fe, SG-n, p)

**431-P. The Thermodynamics of Substances of Interest in Iron and Steel Making. III. Sulphides.** F. D. Richardson and J. H. E. Jeffes. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 165-175.

A survey of available data on thermodynamics of sulfides and of gaseous sulfur compounds of interest in iron and steelmaking. The results are plotted on free-energy vs. temperature diagrams, and equations and likely accuracies are quoted for each substance. 66 ref. (P12, Fe, ST)

**432-P. Magnetic Properties, Internal Strains and the Bauschinger Effect in Metals.** D. V. Wilson. *Nature,* v. 170, July 5, 1952, p. 30-31.

Diagram summarizes results showing that, in the case of a heat treated 0.88% C steel, change in indentation hardness which results from a moderate degree of deformation is dependent on microstructure. Up to a certain limit, with increasing initial hardness, magnitude of the softening effect increases progressively. At higher hardness values, observed softening is less, although initial internal strain energy con-

tinues to increase with hardness. Martensite tempered below about 140° C. does not show the softening effect. A possible explanation of these effects. (P16, Q25, CN)

**433-P. Thermal and Electrical Conductivity of Porous Metals Made by Powder Metallurgy Methods.** P. Grootenhuis, R. W. Powell, and R. P. Tye. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 502-511.

Measurements of thermal conductivity and electrical resistivity over the range of 20-200° C. are reported for several specimens of a sintered porous bronze material (89% Cu, 11% Sn). Suggestions are made for estimating the thermal conductivities of similar porous materials. Graphs. 21 ref. (P11, P15, Cu)

**434-P. Heat Transport in Lead-Bismuth Alloys.** J. L. Olsen. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 518-532.

Variation with temperature and with magnetic field of the heat conductivity of a series of Pb-Bi alloys was measured. Estimates were made from the experimental data of the processes contributing to the heat conductivity, and of resistances due to the various scattering mechanisms limiting these conductivities. Numerous graphs. 17 ref. (P11, Pb, Bi)

**435-P. Infra-Red Absorption by Metals at Low Temperatures.** K. G. Ramanathan. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 532-540.

The infrared absorptivities of several electropolished metal surfaces were measured at liquid-He temperatures with a specially designed radiation cryostat with a black body at room temperature as the source and a differential He-gas thermometer as the detector. The absorptivities of the normal metals, which include a number of alloys, are compared with values calculated by various theories of metallic reflection. Diagrams and tables. (P17)

**436-P. The Spectral Emissivities of Iron, Nickel, and Cobalt.** H. Lund and L. Ward. *Proceedings of the Physical Society,* v. 65, sec. B, July 1, 1952, p. 535-540.

Spectral emissivities were measured by direct comparison of surface and black-body radiation between 1000 and 1300° C. over the wavelength range of 1.0-2.6$\mu$ using a PbS cell and amplifier as the detecting unit. Diagrams, tables and graphs. 13 ref. (P17)

**437-P. A Note on the Theory of Conduction in Metals.** E. H. Sondheimer. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 561-562.

Considers various theories and points out cases where the conventional idea does not apply. Implications of the new theory as applied to the properties of bismuth. (P11, Bi)

**438-P. The Thermal Conductivity of Metals at Low Temperatures.** E. H. Sondheimer. *Proceedings of the Physical Society,* v. 65, sec. A, July 1, 1952, p. 562-564.

The theory of thermal conductivity is compared with experimental results reported by recent investigations. (P11)

**439-P. Measurement of the Thermal Accommodation Coefficients of Gases.** A. E. J. Eggleton, F. C. Tompkins, and D. W. B. Wanford. *Proceedings of the Royal Society,* ser. A, v. 213, June 24, 1952, p. 266-273.

Relates partly to the chemisorption of gases on metals. Theoretical and experimental checks were made on the techniques of Roberts and Bremmer. Experimental values for neon at a tungsten surface. Apparatus diagrams and graphs. (P13, W)

**440-P. Interphase Interfaces.** Cyril Stanley Smith. "Imperfections in Nearly Perfect Crystals," (John Wiley & Sons, New York), 1952, p. 377-401.

Values for interfacial free energy for interfaces involving one solid and a second solid or liquid phase. The data are fragmentary. Additional data, mostly from alloy systems, are tabulated, showing the ratio between two solid-solid interfaces, one of which is usually a grain boundary. Shows experimentally that energy of the interface between two different crystal lattices in metallic phases is almost invariably lower than energy of a grain boundary between two crystals of the same phase differing only in orientation. 12 ref. (P10)

**441-P. Surface and Interfacial Tensions of Single-Phase Solids.** J. C. Fisher and C. G. Dunn. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 317-343; disc., p. 343-351.

Published values of surface and interfacial tensions of single-phase solids are collected, evaluated, and tabulated. Several errors in the literature are corrected. Reasonably good values are obtained for the surface tensions of solid Cu, Ag, and Au, for the grain and twin boundary tensions in Cu, and for the variation in grain-boundary tension with orientation of adjacent grains in silicon iron, Sn, and Pb. 51 ref. (P10, Cu, Ag, Fe, Sn, Pb)

**442-P.** (English.) **On the Structure and Properties of Some Metal and Metal Oxide Films.** Georg Hass and Noel W. Scott. *Centre National de la Recherche Scientifique,* "Les Properiétés Optiques des Lames Minces Solides", 1950, p. 90-98.

Electron-microscope study of the structure and optical properties of vacuum-deposited Ag, Al, Ge, Si, and SiO films. Results charted and illustrated. (P17, M26, L25, Ag, Al, Ge, Si)

**443-P.** (English.) **Some Current Developments in Multilayer Optical Films.** A. F. Turner. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 140-156.

Achromatic anti-reflection coatings; cold mirrors; selective metallic reflectors; interference filters with multiple dielectrics; and frustrated total-reflection filters. (P17)

**444-P.** (French.) **Graphical Study of the Optical Properties of Thin Metallic Films.** D. Malé. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 28-32. (P17)

**445-P.** (French.) **Optical Properties of Thin Films of Silicon.** P. Cotton. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides,' 1950, p. 71-75.

Preparation by vacuum deposition. Apparatus diagrammed; results charted and illustrated. (P17, L25, Si)

**446-P.** (French.) **Evolution of Certain Optical Properties of Very Thin Metallic Films.** M. Perrot. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 81-85.

Vacuum apparatus used. Results of study of Ag films on glass. (P17, Ag)

**447-P.** (French.) **Optical Properties of Thin Platinum Films and Their Comparison With Those of Other Metals.** P. Rouard. *Centre National de la Recherche Scientifique,* "Les Propriétés Optiques des Lames Minces Solides", 1950, p. 86-89.

Study of very thin films of Pt deposited on glass shows the existence of a very distinct minimum of the glass-metal reflection factor for a thickness of about 25 A. (P17, Pt)

**448-P.** (French.) **Theoretical Study of Quintuple Layers of the Type Ag-$MgF_2$-Ag-$MgF_2$-Ag.** Ch. Dufour. *Centre National de la Recherche Scientifique,* "Les Proprietés Optiques des Lames Minces Solides," 1950, p. 109-113.

Theory of the interferometric combination formed by the coupling of two Fabry-Perot standards (with two films fused into one) can be applied to 5-fold thin films of the type: metal, nonabsorbing film, metal, non-absorbing film, metal. Such complex films can form monochromatic interference filters if certain conditions are fulfilled. (P17, Ag)

**449-P.** (English.) **The Reflectivity of Thin Silver Films and the Performance of the Fabry-Perot Interferometer.** H. Kuhn. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides," 1950, p. 118-120. (P17)

**450-P.** (French.) **Optical Properties of Thin Solid Films.** P. Cotton and P. Rouard. *Centre National de la Recherche Scientifique,* "Les Proprietes Optiques des Lames Minces Solides", 1950, p. 157-175.

A classified review. Preparation, properties and applications. 248 ref. (P17, L25)

**451-P.** (German.) **Melting of Cadmium.** Lucie Apelt. *Metalloberfläche,* ser. B, v. 4, July 1952, p. B107-B108.

Vapor-pressure curve for Cd. Significance of observations in comparison with other metals. (P12, E10, Cd)

**452-P.** (German.) **Behaviour of Molybdenum and Nickel and Some Molybdenum-Nickel-Alloys in Acid Electrolytes.** Georg Masing and Günther Roth. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 176-186; July 1952, p. 253-262.

Potential of the Mo electrode depends on pH. This dependence is explained in analogy to Sb. In anodic dissolution, if current density is not too small, Mo follows the relation of Tafel. Divergences are explained. A method for indirect measurement of oxygen-depolarization of different metals permits absolute determination of dissolved $O_2$ in the electrolyte by electrochemical means. From the results, acid resistance of Mo and its alloys can be explained. Second part deals especially with Ni and Ni-Mo alloys, and with a method for measuring the role of oxygen in corrosion. 65 ref. (P15, R2, Ni, Mo)

**453-P.** (French.) **Hall Effect of Iron and Nickel at Low Temperatures.** J. P. Jan and H. M. Gijsman. *Physica,* v. 18, May 1952, p. 339-355.

Hall effect was measured at 14, 20, 64, 83, and 293° K. Hall electric field per unit current density was plotted as a function of magnetic induction in the sample. "Extraordinary" Hall constant, as well as field parameter, was determined. Experiments show that a new parameter, transverse electro-magnetic conductivity, has a temperature variation simpler than the classical Hall constant. 16 ref. (P15, Fe, Ni)

**454-P.** (German.) **Gases in Metals.** P. Bardenheuer. *Metall,* v. 6, July 1952, p. 351-356.

The solubility of gases in metals, particularly the role of hydrogen. Gas absorption of metals, and effects of reaction gases. Degasification of metal melts. Data are charted. 11 ref. (P12, E25)

**455-P.** (German.) **Pyrophoric Metals.** D. A. Pospekhov. *Metall,* v. 6,

July 1952, p. 371-374. *(Translated from Zhurnal Prikladnoi Khimii.)*

Previously abstracted from original. See item 3A-126, 1949. (P11)

**456-P.** (German.) **The Iron-Chlorine System. II. The Equilibrium of the Reaction $FeCl_2$ (Gas) + $H_2$ = Fe + 2HCl.** Harald Schäfer and Kurt Krehl. *Zeitschrift für anorganische und allgemeine Chemie,* v. 268, No. 1-2, 1952, p. 35-46.

Includes thermodynamic computation of reactions of $\alpha$, $\beta$, and $\gamma$-iron and $FeCl_2$. Graphs, and tables. 19 ref. (P12, P13, Fe)

**457-P.** (Russian.) **Solubility of Nitrogen in Iron-Chromium Alloys.** K. T. Kurochkin, P. V. Gel'd, and V. I. Iavoiskii. *Doklady Akademii Nauk SSSR, new ser.,* v. 84, May 11, 1952, p. 329-332.

A study was made using alloys with 3.56-66% Cr and $N_2$ pressures of 512 and 735 mm. of Hg at temperatures of 1500 and 1670° C. Data are tabulated and charted. (P13, Fe)

**458-P.** (Swedish.) **Three-Dimensional Space Representation of Free Energy in Ternary Systems.** Erik Rudberg. *Jerkontorets Annaler,* v. 136, No. 5, 1952, p. 91-112.

The general properties of the Gibbs' free-energy function for ternary systems, particularly in relation to geometric representation as a series of single-phase curved surfaces suspended above the composition triangle. The various equilibrium characteristics of such systems, and the trend of reactions in non-equilibrium situations, are governed by the downward convexity exhibited by these surfaces over stable phase regions. (P12)

**459-P. Permanent Magnets From Powdered Iron.** B. Kopelman. *Electrical Manufacturing,* v. 50, Aug. 1952, p. 88-91, 328.

See abstract of "Permanent Magnets from Ultrafine Iron Powder," *Electrical Engineering,* item 263-P, 1952. (P16, H general, Fe, SG-n)

**460-P. The Electrical Resistance of Binary Metallic Mixtures.** Rolf Landauer. *Journal of Applied Physics,* v. 23, July 1952, p. 779-784.

A theory for a random mixture, based on the assumption that each crystal acts as if surrounded by a homogeneous medium whose properties are those of the mixture. Comparisons with experiment. 18 ref. (P15)

**461-P. Superconductivity in the Cobalt-Silicon System.** B. T. Matthias. *Physical Review,* ser. 2, v. 87, July 15, 1952, p. 380.

A Co-Si melt with 75% Si was found to become superconducting at 1.33° K. X-ray analysis shows two phases: pure Si and $CoSi_2$, in roughly equal proportions. (P15, Co, Si)

**462-P. Single-Crystal Germanium.** G. K. Teal, M. Sparks, and E. Buehler. *Proceedings of the I.R.E.,* v. 40, Aug. 1952, p. 906-909.

The single-crystal Ge now being employed for transistors and for the parallel development of a variety of rectifier and photocell devices. Graphs. 12 ref. (P15, Ge)

**463-P. Properties of Metals Below −300 F.** W. T. Ziegler. *Refrigerating Engineering,* v. 60, Aug. 1952, p. 848-852; disc., p. 852.

Mechanical properties; specific heat; thermal expansion; electrical conductivity; and thermal conductivity. Graphs and 25 ref. (P11, P12, P15, Q general)

**464-P. Navy Develops New Permanent Magnetic Material.** *Steel,* v. 131, July 28, 1952, p. 76-77.

An alloy of manganese bismuthide and unreacted Mn and Bi have the highest recorded coercive force of any known permanent-magnet material. Magnets are made by powder-metallurgy techniques. (P16, H general, Mn, Bi, SG-n)

**465-P. Solutions in Liquid Iron. Part 2. The Influence of Sulphur on the Solubility and Activity Coefficient of Carbon.** J. A. Kitchener, J. O'M. Bockris, and D. A. Spratt. *Transactions of the Faraday Society,* v. 48, July 1952, p. 608-617.

The solubility of graphite in liquid iron was measured from 1200-1700° C. with addition of 0-1.4% S. Thermodynamic and structural significance of the results. Graphs and tables. 21 ref. (P12, Fe)

**466-P.** (English.) **The Change of Conductivity of Metals in Strong Magnetic Fields.** Yasaku Tanabe. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Feb. 1951, p. 91-106.

Change of resistance in a transverse magnetic field was studied in strong magnetic fields at room temperature. The metals studied were Te, Ce, Sb, Fe, Co, and Ni. It was found that there is a distinct difference in the change of resistance between ordinary and ferromagnetic metals. The difference was found to be caused by the fundamental difference in origin of the conduction electrons. (P16, Te, Ce, Sb, Fe, Co, Ni)

**467-P.** (English.) **On the Width of Forbidden Energy Zone of Tellurium.** Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 175-181.

The zone for pure Te at the absolute zero of temperature, and its variation resulting both from thermal dilation and from thermal vibration induced in the crystal lattice when the temperature is increased. (P12, M26, Te)

**468-P.** (English.) **On the Vibrational Spectrum and the Vibrational Specific Heat of a Binary Superlattice Alloy.** Yoshio Shibuya, Yoshüchi Fukuda, and Tadao Fukuroi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 182-186.

Houston's approximate method of finding the frequency distribution function was applied to calculation of vibrational specific heat of $\beta$-brass in the state of any specified degree of order. It is shown that the vibrational specific heat of the disordered alloy is generally larger than that of the ordered one at ordinary temperatures. (P12, Cu)

**469-P.** (English.) **Fundamental Researches on Smelting of Sulphide Ores. VIII. On the Equilibrium in the Reduction of Solid Stannous Sulphide by Hydrogen Gas.** Kingo Sudo. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 187-193.

Equilibrium was measured by a flow method and equilibrium constants determined between 533 and 679° C. Experimental results are summarized in empirical equations. Heat and standard free-energy changes for the formation of solid SnS from the elements at room temperature are calculated. (P12, C21, Sn)

**470-P.** (English.) **Reduction Equilibria of Iron Oxides. III. Measurement of the Equilibrium of the Reaction.** Koji Sanbongi. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 194-200.

Equilibrium was measured in the range 1530-1670° C. and an equation was obtained for the temperature function of the equilibrium constant. Dissociation pressure of molten FeO was calculated. (P12, D general, Fe)

**471-P.** (French.) **Combustion of Aluminum in Air.** René de Salins. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 16, 1952, p. 2437-2439.

Combustion experiments with Al powder in air, by means of a stationary flame. Details of the experiments. Flame-spectra lines are tabulated and discussed. (P17, Al)

**472-P.** (French.) **Charges in the Electrical Conductivity of Metals During Their Fusion.** Genevieve Sutra. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 30, 1952, p. 2589-2591.

Electrical conductivity undergoes an abrupt change at the melting point. Contrary to present opinion, it is shown that this variation is definitely related to volume variation. Data for various metals are tabulated and charted. (P15)

**473-P. The Metal Germanium and Its Use in the Electronics Industry.** Anthony S. Rugare. *Metal Progress,* v. 62, Aug. 1952, p. 97-103.

Production, properties, and applications—mainly as a semi-conductor, processing of Ge billets, "doping" with "donor" (As, Sb, P, or Bi) or "acceptor" (Al) materials, and heat treatment. Crystal and atomic structure and theory of semiconductors as applied to Ge. (P15, T1, M25, M26, Ge)

**474-P.** (Book) **Ferromagnetic Properties of Metals and Alloys.** K. Hoselitz. 317 pages. 1952. Oxford University Press, 114 5th Ave., New York 11, N. Y.; or Amen House, London E.C. 4, England. $8.00.

Comprehensive account of present-day theories of the magnetization curve. Attempts to demonstrate the connection between properties obtained in practice and existing theoretical explanations. The composition and properties of soft magnetic materials, as well as those of magnetic analysis for determination of constitution and structure of ferromagnetic metals and alloys. The potential application of magnetic methods to metallurgical problems. (P16, M27, SG-n, p)

**475-P.** (Book) (French.) **Les Propriétés Optiques des Lames Minces Solides.** (Optical Properties of Thin Solid Films.) 176 pages. 1950. Centre National de la Recherche Scientifique, 45 Rue d'Ulm, Paris 5, France.

A collection of articles by American, British, and French scientists. Theoretical research, various techniques for the preparation of films, experimental research on optical properties, and diversified applications. Presented at Marseille, Apr. 19-23, 1949. Selected papers are separately abstracted. (P17, L25)

# Q

## MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

**748-Q. The Mathematical Theory of Stationary Dislocations.** F. R. N. Nabarro. *Advances in Physics,* v. 1, July 1952, p. 269-394.

Dislocations in an elastic continuum and effect of the crystal structure. Diagrams and graphs. 111 ref. (Q21, M26)

**749-Q. The Nature, Origin, and Effects of Residual Stresses.** R. G. Treuting. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 1-41.

Reviews the multiplicity of effects residual stresses exert on metallic properties, altering electrical

conductivity, magnetic permeability and magnetostriction, chemical potential and reactivity, phase transformations, precipitation, plastic deformation, work hardening, fatigue, creep, elastic and plastic after-effects, recovery and recrystallization, internal friction and elastic properties, mechanical strength and fabrication qualities, and dimensional stability. 50 ref.
(Q25, P general, Q general, N general)

**750-Q. The Measurement of Residual Stresses.** J. J. Lynch. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 42-96.
Some of the more popular methods of residual-stress determination with emphasis on limits of application and accuracy of the results obtained from each technique. Diagrams and graphs. 55 ref. (Q25)

**751-Q. Residual Stress States Produced in Metals by Various Processes.** H. B. Wishart. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 97-128.
Residual-stress states which may be produced by both cooling in air and slow cooling from above room temperature, as well as by quenching and tempering, cold working, grinding, carburizing, and nitriding. Typical results for steel components are charted. 17 ref.
(Q25, J general, ST)

**752-Q. Relief and Redistribution of Residual Stresses in Metals.** D. G. Richards. *American Society for Metals,* "Residual Stress Measurements", 1952, p. 129-204.
Ways of producing a favorable distribution of residual stress; in other words, shop methods for relieving and inducing residual stresses. Ways in which unfavorable redistribution may occur during fabrication and changes in residual stress which take place during service. Diagrams and graphs. 156 ref. (Q25, G general, J1)

**753-Q. A Castable Polyester Resin for Photoelastic Work.** B. Sugarman, G. O. Moxley, and I. A. Marshall. *British Journal of Applied Physics,* v. 3, July 1952, p. 233-237.
Requirements for 3-dimensional model-making plastics. Faults of the few materials used to date. Introduction of a cross-linked polyester resin, readily available, into this field permits further investigations to be conducted. The chemical and physical properties of this new resin, and a theory explaining the "frozen" effect. (Q25)

**754-Q. Welds in Machine Constructions.** W. M. Halliday. *Canadian Metals,* v. 15, July 1952, p. 40, 42.
Various mechanical properties of the welds. (Q general)

**755-Q. The Effect of Certain Metallic Impurities on the Properties of Zamak 3-Type Zinc-Base Die Casting Alloys.** R. C. Bell, J. O. Edwards, and J. W. Meier. *Canadian Mining and Metallurgical Bulletin,* v. 45, July 1952, p. 404-412; disc., p. 412-413; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 262-270; disc. p. 270-271.
Effects of Pb, Cd, Sn, Cu, or In, or combinations, on mechanical properties and dimensional stability. Tests were made under varied conditions of temperature and aging. Apparatus diagram, tables, photographs, and graphs. 21 ref.
(Q general, P10, E13, Zn)

**756-Q. Creep of Annealed High-Purity Copper.** W. D. Jenkins and T. G. Diggers. *Industrial Heating,* v. 19, July 1952, p. 1212, 1214, 1354.
See abstract of "Creep of Annealed and Cold-Drawn High-Purity Copper." *Journal of Research of the National Bureau of Standards;* item 51-Q, 1952. (Q3, Cu)

**757-Q. Creep Buckling of Columns.** Charles Libove. *Journal of the Aeronautical Sciences,* v. 19, July 1952, p. 459-467.
Creep of a slightly crooked H-section column carrying a constant load was studied theoretically. The analysis is intended for any material having creep properties of the same form and for which the constants are known. Applicability to 75S-T Al alloy at 600° F. and low-alloy steel at 800 and 1100° F.
(Q3, Al, AY)

**758-Q. Effect of Strain-Temperature History on the Flow and Fracture of Ingot Iron at Low Temperatures.** Glenn W. Geil and Nesbit L. Carwile. *Journal of Research of the National Bureau of Standards,* v. 48, June 1952, p. 399-406.
A study was made to determine the effect of the strain-temperature history of ingot iron on true stress-strain relationship for specimens extended in tension at −196° to 100° C. Tables and graphs. 12 ref.
(Q27, Fe)

**759-Q. Rare Earth Metals Improve Elevated Temperature Properties of Magnesium Castings.** J. C. McDonald. *Materials & Methods,* v. 36, July 1952, p. 162, 164, 166.
See abstract of "Use of Rare Earth Metals in Magnesium Casting Alloys", *Light Metal Age;* item 109-Q, 1952.
(Q general, E25, SG-h, Mg)

**760-Q. Distortion and Service Tests of Carburized Gears Made of Boron Steels.** (Concluded.) S. L. Widrig and Wilson T. Groves. *Metal Progress,* v. 62, July 1952, p. 75-78.
Results of a test program, with information on heat treatments; on fatigue and chipping tests. Deals with 80B17, 80B20, 8620, 8123, and 94B17 steels. Table and graphs.
(Q general, J26, S21, AY)

**761-Q. Slip Planes and the Energy of Dislocations.** B. Chalmers and Ursula M. Martius. *Proceedings of the Royal Society,* ser. A, v. 213, June 24, 1952, p. 175-185.
The characteristic slip directions and planes in metal crystals can be explained and predicted by taking into account the dependence of the energy of a dislocation on its plane. The reason for the existence of alternative slip systems, particularly at high temperatures. Tables and diagram. 29 ref. (Q24, M26)

**762-Q. Analysis of Localized Stresses in Drilled Calender Rolls.** James T. Bergen. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 13-20.
Localized stresses occurring at heat-transfer-fluid ducts of a large calender roll were investigated by means of a photo-electric model.
(Q25)

**763-Q. Experimental Study of the Transverse Impact of a Mass on a Column.** William H. Hoppmann. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 21-30.
Results of an experimental investigation of response of columns to impact from a solid sphere. Three columns were tested. Comparison is made between theoretical and experimental results. (Q6)

**764-Q. Model Arches in the Flexible Range-Testing Technique.** Robert S. Rowe and Sidney Shore. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 31-42.
Methods and test equipment used to measure moments and thrusts in flexible model arches. Diagrams, graphs, and illustrations. (Q25)

**765-Q. X-Ray Stress Measurements.** C. W. Tucker, Jr., and H. V. Anderson. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 67-74.
Methods, theory, and technique. Typical data for various metals and fabrication processes are charted.
(Q25)

**766-Q. A Study of Fatigue in Metals by Means of X-Ray Strain Measurement.** John A. Bennett. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 105-112.
Study was made on SAE 4130 steel. Apparatus, technique, and results. (Q25, Q9, AY)

**767-Q. Plastics for Photoelastic Analysis.** J. P. Vidosic. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 113-124.
Investigation of some of the newer transparent or translucent plastics, instead of the usual Bakelite. Tables, graphs, diagrams, and photographs of stress patterns in photoelastic test samples. (Q25)

**768-Q. Electric Strain Gage Field Analysis of a Foundation Structure.** J. C. Ascherman. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 125-132.
Methods and techniques used in application and waterproofing of Baldwin SR-4 type strain gages, for a recent field investigation which required strain measurements within vertical water-filled cylinders 160-170 ft. long. A simple method for retaining the desired sensitivity in an SR-4 portable strain indicator (Type K) when lead-in wires 200 ft. and more in length are used. The methods were evolved and used under severe tropical field conditions.
(Q25)

**769-Q. Techniques in Residual Stress Analysis.** Walter Leaf. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 133-140.
In determination of residual stress by the sectioning method, the metal must be removed in such a manner that no appreciable residual stress is created at the fresh surface. Various methods of metal removal which the author has found satisfactory during several years of analysis. Details of measuring and calculating techniques. (Q25)

**770-Q. A Three Dimensional Photoelastic Stress Analysis of a Threaded Drill Pipe Joint.** W. F. Franz. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 185-194.
Fundamental theory method of machining models, and testing technique. Two test specimens were made and tested. Results show good agreement when compared with those of actual fatigue tests on steel test specimens. (Q25, ST)

**771-Q. Quantitative Evaluation of Residual Stresses by the Stresscoat Drilling Technique.** A. G. Tokarcik and M. H. Polzin. *Proceedings of the Society for Experimental Stress Analysis,* v. 9, no. 2, 1952, p. 195-207.
The Stresscoat drilling technique with dye-etchant sensitizer for measuring residual stresses was applied to a Mg casting. Rather large radial crack patterns of uniform size were obtained regardless of the area investigated. The dissection method, consisting of mechanically isolating a small piece with a jeweler's saw, etching off the cold worked layer, and reading the relaxation by strain gages as described by Found, was then applied to the same casting. The results showed negligible residual stresses of a compressive nature. Therefore, the Stresscoat method was investigated further in an attempt to explain the discrepancy in Mg and also to extend the work to Al and steel. (Q25, Mg, Al, ST)

**772-Q. Test Bar Design Influences Results on Investment Castings.** R. J. Wilcox. *SAE Journal,* v. 60, July 1952, p. 32-36.

Test results are tabulated for cast-to-size and machined-to-size carbon and alloy-steel bars. Results show marked effect of design, which complicates establishment of a standard classification of investment castings according to mechanical properties.
(Q general, E15, CN, AY)

**773-Q. Hysteresis of Shaft Materials in Torsion.** W. P. Welch and B. Cametti. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 753-763; disc., p. 763-764.

Elastic hysteresis tests were limited to those shaft materials that could be supplied in large diameters. Since solid shafts are usually employed in these applications, the tests were conducted on solid specimens, except for one tubular specimen included for the purpose of comparison. Materials tested were SAE 1015 and 4140, K Monel, and Inconel 'X'. Graphs, photographs, tables, and diagrams. 11 ref.
(Q21, Q1, CN, AY, Ni)

**774-Q. A Time-Temperature Relationship for Rupture and Creep Stresses.** F. R. Larson and James Miller. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 765-771; disc., p. 771-774.

Relationship was adapted and applied to existing data on several widely different ferrous and nonferrous alloys with good results. Methods by which short-time tests can be used to determine long-time properties. Numerous tables and graphs. 15 ref. (Q3, Q4)

**775-Q. Effect of Temperature Variation on the Long-Time Rupture Strength of Steels.** Ernest L. Robinson. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 777-780; disc., p. 780-781.

A method of computing the factor of safety of a structural member with reference to a stated life while operating under stress at high temperature when the temperature or stress varies moderately according to some definite pattern. Tables and graphs. Data for Timken 16-25-6 steel. (Q4, ST)

**776-Q. High-Temperature Stress-Rupture Testing of Tubular Specimens.** L. F. Kooistra, R. U. Blaser, and J. T. Tucker, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 783-791; disc., p. 791-792.

Method was developed in which a tubular specimen under internal steam pressure and at a controlled temperature is tested in stress rupture. Test apparatus and a number of the test results for S49 steel; Croyloys 3M, 9, and 12; and stainless steels 16-13-3, 18-8, 18-8 Cb, and 18-8 Si are discussed in relation to similar data obtained on simple tension specimens. Graphs, tables, and photographs. (Q4, SS, CN, AY)

**777-Q. Rupture and Creep Characteristics of Titanium-Stabilized Stainless Steel at 1100 to 1300 F.** J. W. Freeman, G. F. Comstock, and A. E. White. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 793-801; disc., p. 801.

Rupture and creep strengths were established at 1100, 1200, and 1300° F. for 18-8 + Ti steel heat treated at 1900 and 2050° F. Several Ti-C ratios were included as a variable. Results are tabulated. Graphs and photomicrographs. (Q3, Q4, SS)

**778-Q. Behavior of an Idealized Steel H Column Above the Elastic Range.** Walter H. Weiskopf. *Welding Journal,* v. 31, July 1952, p. 353s-360s.

A mathematical method of analyzing H columns bent about the strong axis. Type of failure and magnitude of direct load and bending moments causing it. (Q5, ST)

**779-Q. Mechanical Strength and Creep in Metals.** N. F. Mott. "Imperfections in Nearly Perfect Crystals" (John Wiley & Sons, New York), 1952, p. 173-190; disc., p. 190-196.

Effects responsible for mechanical strength in metals include dissolved impurities, which may lock dislocations without diffusing to them, as well as impurities after a process of diffusion, as envisaged by Cottrell. Frank's ideas on the strength of pure metals, which depend on the distance between the two locking points of a Frank-Read source, are reviewed. Finally, a theory of exhaustion creep is compared with experiments of Davis and Thompson. (Q23, Q3)

**780-Q. The Influence of Dislocations and Impurities on the Damping and the Elastic Constants of Metal Single Crystals.** J. S. Koehler. "Imperfections in Nearly Perfect Crystals." (John Wiley & Sons, New York), 1952, p. 197-212; disc., p. 212-216.

The motion of edge-type dislocations which are "pinned down" by impurity atoms is treated for the case of a periodic external stress. An expression for distribution of free lengths of dislocation is obtained. Zero-amplitude decrement and plastic contribution to the elastic constants are calculated. Amplitude dependence is discussed by supposing that some of the dislocations break away from the impurities. The results obtained are in agreement with experiment if the damping force on a dislocation is about 100 times previously suggested values. 15 ref.
(Q21, Q8)

**781-Q.** (French.) **Theories of the Fracture of Metals.** P. Laurent. *Métaux: Corrosion—Industries,* v. 27, May 1952, p. 189-200.

Reviews the above on the basis of the literature. Fracture of monocrystals and polycrystals. Graphs. 14 ref. (Q26)

**782-Q.** (French.) **Conditions for the Occurrence of Fractures During Creep Tests.** Georges Vida. *Métaux: Corrosion—Industries,* v. 27, May 1952, p. 201-215.

Causes for acceleration of creep and of fracture; and influence of various factors on type of creep fracture, and upon the time required for fracture, and for extension of the fracture. Graphs, micrographs, and 22 ref. (Q3)

**783-Q.** (French.) **Mechanical Properties of Solids as a Function of Temperature. (Plasticity, Viscosity, and Internal Friction.)** Paul Le Rolland. *Métaux: Corrosion—Industries,* v. 27, May 1952, p. 216-232.

Discussed on the basis of the literature. Treats in particular the perfect crystal at absolute zero, thermal agitation, the imperfect crystal, the migration of atoms, hardening, and the role of internal stresses. 11 ref. (Q22, Q23)

**784-Q.** (French.) **Considerations on the Modulus of Elasticity and Elastic Limit of Alumina—Aluminum Complexes.** R. de Fleury. *Revue de l'Aluminium,* v. 29, May 1952, p. 183-185.

Recent study by Roland Irmann on sintered, heat resistant Al. Explains, on the basis of theoretical considerations, the peculiar characteristics of above sintered mixture. (Q21, Al)

**785-Q.** (French.) **A Method for Determining Strains Produced by Electrodeposits With the Aid of Wire Strain Gages.** E. G. Ramachandran and K. V. Chinnappa. *Revue de Métallurgie,* v. 49, Jan. 1952, p. 60-64.

Apparatus and procedure. Details of calculations and results of application of the technique to Ni deposits on steel. 11 ref.
(Q25, L17, Ni, ST)

**786-Q.** (French.) **The Effect of Premature Manipulation of Ingots on the Quality of Rails.** J. G. Platon. *Revue de Métallurgie,* v. 49, June 1952, p. 436-438; disc., p. 438.

Results of such handling, as internal cracks, during customary factory procedure. Suggestions for improving the process.
(Q25, F21, ST)

**787-Q.** (German.) **Roller-Bearing Problems. VDI-Forschungsheft 434**, 1952. (Supplement to **Forschung auf dem Gebiete des Ingenieurwesens,** v. 18, sec. B, 1952), 28 pages.

Contains two papers: "The Plastic Behavior of Rotating Steel Rollers Having Point Contact," G. Niemann and K. W. Kraupner; and "Oscillations in Ball and Roller Bearings Having Statically Fixed Supports," Hans Perret. (Q general, ST)

**788-Q.** (German.) **Hardness Measurements on Electrodeposited Layers.** Albert Keil and Otto Wüst. *Metalloberfläche,* ser. A, v. 6, July 1952, p. A102-A106.

Various apparatus and methods. Sources of errors. Micrographs.
(Q29, L17)

**789-Q.** (German.) **General Considerations on the Testing of Steels for Their Tendency to Brittle Fracture.** Ed. Amstutz. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May, 1952, p. 149-152.

No known tests are capable of supplying absolute values concerning brittle fracture. Warns against using favorable test results for the purpose of disguising production defects. (Q26)

**790-Q.** (German.) **Temper Brittleness, Its Occurrence, Causes, and Methods for Avoidance.** A. Legat. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 160-168.

Tests made by various investigators on Cr, Mn, and Si steels. Graphs. (Q23, AY, SS)

**791-Q.** (German.) **Permanent Hot Hardness of High Speed Steels.** E. Bickel. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 168-173.

The permanent hot hardness of tungsten high speed steels with various additions of Co, also during normal heat treatment. Results at various temperatures. Graphs.
(Q29, J general, TS)

**792-Q.** (German.) **The Behavior of Materials and Their Welds at Low Temperatures.** Werner Hoffmann. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, June 11, 1952, p. 519-522.

Low-temperature mechanical-property tests down to −195° C. with welded and unwelded carbon and alloy steels indicate that the welds do not materially reduce the strength of the steels. Tables, graphs, and photomicrographs.
(Q general, ST)

**793-Q.** (German.) **Testing Machines.** H. Mintrop. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 604-608.

New designs of mechanical-property testing devices. 51 ref.
(Q general)

**794-Q.** (German.) **A Simple Method of Measuring Elastic Constants With the Aid of Ultrasonic Impulses.** A. Lutsch. *Zeitschrift für angewandte Physik,* v. 4, May 1952, p. 166-168.

Method measures the time required for a sound impulse to pass back-and-forth through the specimen. (Q21, S13)

**795-Q.** (Russian.) **Influence of Surface-Active Materials on Plastic Flow of Polycrystalline Metals.** T. A. Amfiteatrova and B. Ia. Iampol'skii. *Doklady Akademii Nauk SSSR,* new ser., v. 84, May 11, 1952, p. 305-308.

Experiments were made with Al and Cu wires. Various alcohols, sodium dioctyl-sulfosuccinate, and butylstearate, were used as the surface-active agents. Data are charted. (Q24, Al, Cu)

**796-Q. The Measurement of Non-Electrical Quantities.** G. von Basel. *Engineers Digest,* v. 13, July 1952, p. 219-222. (A condensation.)

Reviews various methods. A transducer or pick-up arrangement and a special transmission element which enables signals from transducers on rotating parts to be transmitted inductively to stationary elements without using slip rings. Various designs developed include a 4-mm. strain-measuring element as well as torque meters, torsional vibration indicators, and dynamic pressure pickups. Diagrams. (Q24)

**797-Q. The Creep of Zinc Single Crystals.** L. Slifkin and W. Kauzmann. *Journal of Applied Physics,* v. 23, July 1952, p. 746-753.

Transient creep of single crystals prepared from 99.999% Zn was studied at 35° C. and at strain rates of the order of $10^{-5}$. Results are interpreted in terms of recent models of the metallic state. 27 ref. (Q3, Zn)

**798-Q. Note on the Strain Aging of Iron Single Crystals.** A. N. Holden and F. W. Kunz. *Journal of Applied Physics,* v. 23, July 1952, p. 799.

Several single crystals of high-purity Fe in wire form several inches long and 0.025 in. in diam. were grown for use in internal-friction damping experiments. Tensile tests indicated that these crystals had only very small initial yield points, but were very susceptible to strain aging and exhibited very marked yield-point effects after straining and aging short times at room temperature. Several interesting results are pertinent to a theoretical understanding of the strain-aging phenomenon. Graphs. (Q22, Q8, M26, Fe)

**799-Q. The Effect of Zirconium on the Properties and Structure of Superduralumin, With Particular Reference to Forgings.** M. Tournaire and M. Renouard. *Journal of the Institute of Metals,* v. 80, July 1952, p. 593-597.

Superduralumin A-U4 GI (Duralumin FR) is frequently used in France for high-strength forgings. However, these forgings, particularly those of large size, are susceptible to quenching cracks and in addition, like forgings of ordinary duralumin, they show considerable variations in grain size in different parts of the same section. It was found that if the Mn content of the alloy is replaced, wholly or partly, by 0.25% Zr, forgings are obtained whose mechanical properties are in no way inferior but which have a fine and uniform grain size. The new alloy can also be cast, by a semicontinuous method, into very large billets with less risk of fissures than with ordinary superduralumin, and it can be forged with greater ease. (Q general, M27, Al)

**800-Q. Sixth Hatfield Memorial Lecture: The Flow of Metals.** E. N. da C. Andrade. *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 217-228.

Emphasis on constant stress test methods. Data for various metals are charted. 19 ref. (Q24)

**801-Q. Lubrication and the Load-Carrying Capacity of Gears.** E. T. Hutt. *Lubrication Engineering,* v. 8, Aug. 1952, p. 180-182, 201-202; disc., p. 202-203.

The functions of oil supply in relation to recognized types of gear failure. The oil is shown to be much more than a mere lubricant in the exact sense of the word. Ways in which operating conditions and choice of lubricating oil can influence scoring and pitting of gears in service. Some research findings concerning influence of oil properties and other factors. 18 ref. (Q9)

**802-Q. Reversed-Bending Fatigue Tests on Cable-Sheaths.** C. J. Thwaites. *Metal Industry,* v. 81, July 18, 1952, p. 50.

Since the lead normally produced by Broken Hill, Rhodesia, contains approximately 0.02% Ag, an amount which is insufficient for economic recovery, and since this lead will be used in South Africa and probably in other parts of the Commonwealth as a basic material for cable sheathing, it was desired to ascertain the effect of this silver content on fatigue properties of the lead and of alloys made therefrom. Test procedure. Results are tabulated and charted. (Q7, Pb)

**803-Q. Plastic Stress-Strain Relations for Combined Tension and Compression.** Joseph Martin and H. A. B. Wiseman. *National Advisory Committee for Aeronautics,* Technical Note 2737, July 1952, 61 pages.

Plastic stress-strain relations for biaxial tension-compression principal stresses were determined for a 14S-T4 Al alloy. Constant stress ratio tests provided control data and information on influence of biaxial stresses on yield strength of the material. Variable stress ratio tests were made to determine whether the deformation or flow theory agrees better with actual plastic stress-strain relations, and special tests were conducted to check the validity of various assumptions made in these theories. Data on shear are also given. Tables, diagrams, and graphs. (Q27, Q28, Al)

**804-Q. Influence of Chemical Composition on Rupture Test Properties at 1500° F of Forged Chromium-Cobalt-Nickel-Iron Base Alloys.** J. W. Freeman, J. F. Ewing, and A. E. White. *National Advisory Committee for Aeronautics,* Technical Note 2745, July 1952, 69 pages.

62 alloys involving systematic individual variations of 10 elements present in a forged Cr-Co-Ni-Fe base alloy in the solution-treated and aged condition and simultaneous variation of Mo, W, and Cb were rupture-tested at 1500° F. It was found that the elements can be varied individually between quite wide limits without significantly changing the rupture properties. Data on creep rate. Possible mechanism. Photomicrographs, tables, and graphs. (Q4, Fe, Cr, Co, Ni)

**805-Q. Preview of Behavior of Grain Boundaries in Creep of Aluminum Bicrystals.** F. N. Rhines and A. W. Cochardt. *National Advisory Committee for Aeronautics,* Technical Note 2746, July 1952, 40 pages.

Gliding of Al bicrystals along their mutual boundary was studied during creep tests at 200 to 650° C. and 1 to 100 psi. Photomicrographs, diagrams, graphs, and Laue patterns. 10 ref. (Q3, Al)

**806-Q. Photo-Elastic Determination of Boundary Stresses.** William Shelson. *Nature,* v. 170, July 12, 1952, p. 82-83.

Improved method and apparatus. (Q25)

**807-Q. The Flow of Solids.** B. Gross. *Physics Today,* v. 5, Aug. 1952, p. 6-11.

Fundamental principles. (Q24)

**808-Q. Effect of Chemistry and Section Size on Properties of Ductile Iron.** D. J. Reese, F. B. Rote, and G. A. Conger. *SAE Quarterly Transactions,* v. 6, July 1952, p. 385-394.

Investigations conducted at the University of Michigan under the sponsorship of International Nickel Co., to determine influence of C, Si, and P contents and of section size on the mechanical properties of ductile cast iron. Tables, graphs and photomicrographs. (Q general, CI)

**809-Q. Hardness, Elastic Modulus, Wear of Metals.** T. L. Oberle. *SAE Quarterly Transactions,* v. 6, July 1952, p. 511-515; disc., p. 516-517.

Proposes a new concept of wear and elastic limit of strain as a practical measure of these properties. Introduces the term "modell," which is defined as Brinell hardness multiplied by $10^6$ and divided by elastic modulus. This unit gives an indication of the depth of penetration that a metal can tolerate without exceeding its elastic limit. Graphs and tables and data for a wide variety of ferrous and nonferrous metals and alloys. 11 ref. (Q21, Q29, Q9)

**810-Q. Some Phenomena of Engine Wear as Revealed by Radioactive Tracer Technique.** H. R. Jackson, F. C. Burk, L. J. Test, and A. T. Cowell. *SAE Quarterly Transactions,* v. 6, July 1952, p. 518-524; disc., p. 524-530.

Effect of operating conditions, lubrication, and fuel on engine wear. Graphs and photographs. (Q9)

**811-Q. Current Practice in Tractor Bevel Gears.** Wayne H. Worthington and Kenneth J. Harris. *SAE Quarterly Transactions,* v. 6, July 1952, p. 531-546.

Study based upon an analysis of 68 pairs of tractor bevel gears, selected by 10 tractor manufacturers as representative of best current practice. Basic bevel-gear systems in use, based upon method of cutting. Static and maximum tensile stresses, fatigue life analysis, materials, and heat treatment. (Q27, Q7, J general, T7, ST)

**812-Q. Strain Gages Check In-Flight Rotor Stress.** *Steel,* v. 131, July 28, 1952, p. 77.

Measurement of major strains in helicopter rotor blades while in flight, as done at Piasecki Helicopter Corp. Baldwin SR-4 bonded resistance wire gages are used. (Q25, ST)

**813-Q. Steel Drawability Measured in a Minute.** *Steel,* v. 131, Aug. 4, 1952, p. 100, 102.

Two instruments developed at Jones & Laughlin give basic steel industry, fabricators, warehousemen, quick method of indicating bend resistance and strain behavior of steel sheets. (Q5, G4, ST)

**814-Q. Round Work Correction for Rockwell Hardness.** Louis Small and Keith Symon. *Tool Engineer,* v. 29, Aug. 1952, p. 41-45.

Analyzes errors involved in the Rockwell testing of round work so that a correction chart can be developed for use with Rockwell hardness specifications. (Q29)

**815-Q. Alternate Steels Offer Many Important Economic Advantages in Addition to Conserving Materials.** George Huck. *Western Metals,* v. 10, July 1952, p. 51-54.

Graphs and tables give data on various alloy steels, especially their mechanical properties and hardenabilities. (Q general, J26, AY)

**816-Q.** (French.) **Photoelastic Study of Fracture During Pure Bending.** Félix Zandman. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 9, 1952, p. 2337-2339.

Photo-elastic study made on a sample of methyl methacrylate. The photographs show the origin of the

fracture and its mode of propagation. (Q25, Q26)

**817-Q.** (French.) **Improvements in Chromium-Molybdenum Steel Resistant to Elevated Temperatures.** O. L. Bihet and A. Gourlez de la Motte. *L'Ossature Métallique,* v. 17, June 1952, p. 327-331.

Experiments on addition of V to increase the hardness of Cr-Mo steel containing 0.5-0.7% Cr and 0.4-0.5% Mo. Investigation with the electron microscope. Graphs and micrographs. (Q29, AY)

**818-Q.** (German.) **Recent Results on the Endurance of Riveted Joints in Aluminum Sheets.** Hermann Bürnheim. *Aluminium,* v. 28, May 1952, p. 140-143; July-Aug. 1952, p. 222-229.

Graphs and tables show little variation among various Al and Mg alloys in dynamic strength properties. Second part: Influence of design, layout, and riveting method on endurance of riveted joints. (Q7, Al, Mg)

**819-Q.** (German.) **Aluminum-Zinc-Magnesium Alloys.** P. Brenner. *Aluminium,* v. 28, July-Aug., 1952, p. 216-222.

Improvements in yield and tensile strengths; also in corrosion resistance. Effects of addition of Cu. Graphs and tables show comparative properties of the various compositions. Effects of plating with different metals, and phase diagrams for the systems Al-Zn-Mg, Al-Si-Mg, and Al-Cu-Mg, all in the Al-rich regions. 23 ref. (Q general, R general M24, Al)

**820-Q.** (German.) **Endurance Limit of Welded and Unwelded Steel Specimens With and Without Influence of Corrosion.** Clemens Appaly and Franz Bollenrath. *Brennstoff-Wärme-Kraft,* v. 4, July 1952, p. 223-227.

Reports on experiments on low-alloy Mn and Cr-Mn steels, with and without exposure to aqueous corrosion. Experimental details; results tabulated and charted. (Q7, R4, AY)

**821-Q.** (German.) **The Behavior of Metallic Materials at Low and High Temperatures.** W. Ruttmann and M. Werner. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 11, 1952, p. 673-682.

Proposes the plotting of time-resistance diagrams for materials showing mechanical properties which are dependent upon temperature and time. Data are tabulated and charted for a wide variety of ferrous and nonferrous metals. 33 ref. (Q general)

**822-Q.** (Spanish.) **Mechanical Tests With Micro-Test Specimens.** F. del Moral and M. Alvarez. *Ciencia y Técnica de la Soldadura,* v. 1, July-Aug. 1951, 8 pages.

Apparatus which makes it possible to carry out tensile, fatigue, and shear tests on very small test pieces. This machine produces a photographic diagram of strengths and deformations, from which can be deduced all of the characteristics of the material under study. (Q27, Q2, Q7)

**823-Q.** **A New Micro-Bending Test Method.** N. Mironoff. *Engineers' Digest,* v. 13, July 1952, p. 210-211. (Translated and condensed.)

Previously abstracted from *Revue de la Soudure.* See item 337-Q, 1952. (Q5, Q23)

**824-Q.** **Chrome Carbide Has Unusual Physical Properties.** *Iron Age,* v. 170, Aug. 14, 1952, p. 129.

Test results on hardness, density, transverse rupture strength, compressive strength, coefficient of thermal expansion, abrasive resistance, resistance to oxidation, resistance to corrosion, and magnetic permeability. (Q general, P16, R general, Cr, C-n)

**825-Q.** **Clutches.** A. F. Gagne Jr. *Machine Design,* v. 24, Aug. 1952, p. 123-158.

Details of design, selection, and application for optimum performance. Includes tables of characteristic features of commercially available clutches, of industrial clutch manufacturers, and of frictional properties of metallic and nonmetallic clutch materials. Numerous diagrams and illustrations. 31 ref. (Q9, T7)

**826-Q.** **Proof Testing of Full Sized Automobile Components.** A. L. Boegehold. *Metal Progress,* v. 62, Aug. 1952, p. 82-86.

Fatigue-testing equipment and procedures of Research Laboratories Div., General Motors Corp. (Q7)

**827-Q.** **Embrittlement in Plated Steel.** John J. Dale. *Metal Progress,* v. 62, Aug. 1952, p. 95-96.

Two examples of damage done to steel parts by hydrogen generated during electroplating operations. In each instance the defects show marked directionality. (Q23, L17, ST)

**828-Q.** **High-Temperature Embrittlement of Straight Chromium Steels.** *Metal Progress,* v. 62, Aug. 1952, p. 156, 158, 160. (Condensed from "High-Temperature Embrittlement in Chromium-Iron Alloys Containing 12-16% Chromium", Helmut Thielsch, *Metallurgia.*)

Previously abstracted from original. See item 63-Q, 1952. (Q23, N8, SS)

**829-Q.** **Crushing Strength Requirements Metallurgy.** *Precision Metal Molding,* v. 10, Aug. 1952, p. 29, 86.

Textile-machinery chain roll made of Fe 5% Cu powder. Advantages over machined gray cast iron. (Q27, H general, Fe)

**830-Q.** **Allowable Design Loads for Aluminum Columns.** Martin A. Rubinstein. *Product Engineering,* v. 23, Aug. 1952, p. 197, 199, 201.

Nomograms, their mathematical development, and illustrative examples. (Q28, Al)

**831-Q.** **Bhn/E $\times$ 10⁶ = Modell = Measure of Wear Resistance.** *SAE Journal,* v. 60, Aug. 1952, p. 42-45; disc., p. 45-46. (Excerpts from "Hardness, Elastic Modulus, and Wear of Metals", by T. L. Oberle.)

Ratio of Brinell hardness to elastic modulus, multiplied by $10^6$ is designated "modell". Modell values for various materials are tabulated and discussed. (Q9)

**832-Q.** **A Researcher's Casebook on Magnesium Truck Wheels.** *SAE Journal,* v. 60, Aug. 1952, p. 61-66. (Excerpts from "Magnesium Alloy Truck Wheels Evaluated Analytically", by Marvin H. Polzin.)

Results of investigation of bending strength, endurance limit, fatigue strength, stress-strain properties, as compared with Al and steel. Effects of design factors. (Q general, T21, Mg)

**833-Q.** **Transition From Ductile to Brittle Behavior in Pressure Vessel Steels.** T. N. Armstrong, N. A. Kahn, and Helmut Thielsch. *Welding Journal,* v. 31, Aug. 1952, p. 371s-380s.

Nature of brittle behavior, evaluation of brittle behavior of steels, effects of temperature, transition temperature, effects of notches and notch sensitivity, test methods, code-test requirements, significance of test data, ductility and fracture transition, factors determining transition temperatures, metallurgical factors, mechanical factors, and fields for further study. (Q23, CN, AY)

**834-Q.** (Book) **Mechanical Properties of Metals at Low Temperatures.** 206 pages. 1952. National Bureau of Standards, Circular 520. (Available from Superintendent of Documents, Washington 25, D. C.) $1.25.

Proceedings of the NBS Semicentennial Symposium, Washington, D. C., May, 1951. (Q general)

**835-Q.** (Book) **Report on the Elevated-Temperature Properties of Stainless Steels.** Ward F. Simmons and Howard C. Cross. 115 pages. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Special Technical Publication 124.) $4.00.

Essentially a graphical summary of elevated-temperature data for the commercially produced stainless steels. Includes summary curves for tensile strength, 0.2% offset yield strength, % elongation, % reduction of area, stresses for rupture in 100, 1000, 10,000, and 100,000 hr., and stress for creep rates of 0.0001 and 0.00001% per hr. (1% in 10,000 and 100,000 hr). Appendix contains the primary data from which the summary curves were drawn. (Q general, SS)

**836-Q.** (Book) **Residual Stress Measurements.** 210 pages. 1952. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.50.

Four educational lectures presented during the 33rd National Metal Congress and Exposition, Detroit, Oct. 15-19, 1951. Individual lectures are abstracted separately. (Q25)

# R

## CORROSION

**378-R.** **Preserving What You Have: From the Corrosion Engineer's Viewpoint.** E. A. Tice. *Chemical Engineering Progress* (Engineering Section), v. 48, July 1952, p. 329-332.

Effects of aeration or presence of oxidizing agents; velocity of media flow or agitation effects; and temperature. Data for stainless steels, high-Ni alloys, cupronickels, and Zn are charted. (R10, Zn, SS, Ni, Cu)

**379-R.** **Corrosion in $CO_2$-$H_2S$-Amine System.** E. C. Carlson, G. R. Davis, and K. L. Hujaak. *Chemical Engineering Progress* (Engineering Section.), v. 48, July 1952, p. 333-335; disc., p. 335-336.

The increased utilization of natural gas from sour gas areas has multiplied the number of plants using amine systems for gas sweetening. In some cases, severe corrosion problems have been encountered. Operating conditions were simulated on a pilot scale. It was found that the metal attack could be reproduced when the amine contained small residual amounts of both $CO_2$ and $H_2S$ and the heat medium was oil at 500° F. Reduction of the oil temperature to 370° F. practically eliminated corrosion in the pilot unit. (R7, CN)

**380-R.** **Effect of Annealing on the Resistance of Galvanized Steel to Atmospheric Corrosion.** S. E. Hadden. *Journal of the Iron and Steel Institute,* v. 171, June 1952, p. 121-127.

Exposure tests of galvanized steel wire and sheets, as-received and annealed for various times at different temperatures; effect of annealing on structure, composition, and mechanical properties of galvanized steel wire; and mechanical strength of wires after test. Tables, graphs, and photomicrographs. (R3, Q general, M27, Sn, ST)

**381-R.** **Corrosion Studies at "Sea Horse Institute".** *Metal Progress,* v. 62, July 1952, p. 88-89, 124.

Facilities at International Nickel

Co.'s marine corrosion laboratory, Harbor Island, North Carolina. (R11)

**382-R. The Effect of Iron on the Corrosion Resistance of Copper-Nickel Alloys.** *Metal Progress,* v. 62, July 1952, p. 174, 176. (Condensed from "Copper-Nickel-Iron Alloys Resistant to Sea-Water Corrosion", G. L. Bailey.)

Previously abstracted from *Journal of the Institute of Metals.* See item 298-R, 1951. (R4, Cu)

**383-R. Pitting of Aluminum in a Heavy-Water Reactor.** *Nucleonics,* v. 10, July 1952, p. 19.

The fuel rods in the heavy-water reactor at Kjeller, Norway, consist of uranium slugs stacked inside aluminum tubes with 2-mm. walls. Pitting and corrosion have affected the outer surface of these tubes where they were immersed in the heavy-water moderator. (R2, Al)

**384-R. Air Brake Corrosion Problems.** C. E. Macfarlane. *Railway Mechanical and Electrical Engineer,* v. 126, July 1952, p. 72-76.

Corrosion of essential parts of this equipment which consists of various control valves, usually made mostly of cast iron, or in some cases Al, and which contain parts made of brass, Zn die castings, steel, and plastics. (R3)

**385-R. Corrosion. 6. Prevention of Corrosion by Means of Inhibitors.** R. S. Thornhill. *Research,* v. 5, July 1952, p. 324-332.

Recent theories of inhibitive action. Properties of the more common inhibitors, and their industrial uses. 41 ref. (R10)

**386-R. Experimental Superheater for Steam at 2000 Psi and 1250 F—Progress Report of Field Operation.** F. G. Ely and F. Eberle. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 803-812; disc., p. 812.

To investigate the properties of new superstrength alloys for high-temperature steam superheater service a test element constructed of 2-in o.d. alloy tubes was installed in an operating boiler at Twin Branch plant and supplied with steam at 2000 psig. and 950° F., which was heated at 1250° F. Operating conditions, and results of the first 5000 service hr. Croloy 2¼; types 304, 316, 318, 321, and 347 stainless steels, Timken 16-25-6, and Armco 17-14 Cu-Mo were tested. Internal surface conditions and microstructures of the tubes after test were examined. (R4, SS, SG-g, h)

**387-R. Behavior of Superheater Tubing Materials in Contact With Combustion Atmospheres at 1350 F.** H. A. Blan, A. M. Hall, and J. H. Jackson. *Transactions of the American Society of Mechanical Engineers,* v. 74, July 1952, p. 813-819.

Report on the field-test phase of experiments at Battelle Memorial Institute. Materials tested were austenitic stainless steels, Ni-base alloys, and aluminized cold rolled steel. Tables, diagrams, graphs, and photomicrographs. 11 ref. (R2, SS, Ni, Cn, Al)

**388-R.** (French.) **The Resistance of Light Alloys to Marine Corrosion.** Andre Guilhaudis. *Revue de l'Aluminium,* v. 29, Mar. 1952, p. 85-91; Apr. 1952, p. 127-133; May 1952, p. 175-179.

First part: Marine corrosion test stations established at Salin-de-Giraud and St-Jean-de-Luz by the Service des Recherches et Essais Physiques de Chambery of the Pechiney Company, in France. Second part: Behavior of unprotected Al and light alloys, Al-Mn, Al-Mg, Al-Mg-Si, Al-Cu-Mg, when submitted to spray, permanent immersion, and alternate immersion-emersion. Influence of work-hardening and tension; of the quenched and tempered state; and of thickness, partial annealing, and orientation of the test piece. Third part: Al-Zn-Mg and Al-Zn-Mg-Cu alloys. In the casting alloys, the Al-Mg alloys offer the best resistance. Plating with Al or Al-Zn provides good protection for some alloys. Resistance to marine corrosion of Cu, Ni, Sn, Zn, ordinary steel for ships' hulls, stainless steel, and brass. (R4, Al)

**389-R.** (French.) **Structure and Corrosion of Al-Mg and Al-Zn-Mg Alloys. Mechanism of Intergranular Corrosion and Stress Corrosion.** Pierre A. Jacquet. *Revue de Métallurgie,* v. 49, May 1952, p. 339-363.

Preparation of the specimens, and the experimental arrangement. Numerous optical and electron micrographs illustrate results obtained. Includes tabular and graphical data. (To be continued.) (R1, R2, Al)

**390-R.** (French.) **Structure and Corrosion of Aluminum-Magnesium and Aluminum-Zinc-Magnesium Alloys. Mechanism of Intergranular and Stress-Corrosion.** (Concluded.) **Part III. Structure and Corrosion of Aluminum-Zinc-Magnesium Alloys. Part IV. Mechanism of Intergranular Corrosion and Stress-Corrosion.** Pierre A. Jacquet. *Revue de Métallurgie,* v. 49, June 1952, p. 439-452.

Reviewed on the basis of the literature. Nature of the alloys, influence of thermal treatment on surface conditions, and of plastic deformation on corrosion. The mechanisms of anodic attack and of stress-corrosion. Tables, graphs, and micrographs. 36 ref. (R1, R2, Al)

**391-R.** (German.) **Investigation of the Formation of Black Stains on the Running Surfaces of Rails.** Walter Jäniche. *Stahl und Eisen,* v. 72, June 19, 1952, p. 758-765; disc., p. 765-766.

Caused by accumulation of corrosion products in the depressions. Stained rails were examined to determine influence of nonmetallic inclusions and rupture at the edges due to excessive loads. (R11, Q4, CN)

**392-R.** (German.) **The "Inverse Dependence" of the Corrosion of Metals on Some Influencing Factors.** G. Schikorr. *Metall,* v. 6, July 1952, p. 356-360.

Effect of salt concentration, acid concentration, amount of the attacking substance, temperature, precipitation, and composition of the metal. 29 ref. (R2)

**393-R.** (German.) **Improvements in the Development of Corrosion Resisting Materials.** (General Survey). **Part I. Iron and Steel.** Erich Franke. *Werkstoffe und Korrosion,* v. 3, July 1952, p. 265-274.

Based on the most important relevant publications of 1950, a survey is given of the corrosion behavior of carbon steels, low and high-alloy stainless steels, Fe-Si alloys, and cast iron. Substitution of Ti for Cb in stabilized 18-8 stainless steels. 168 ref. (R general, Fe, ST, SG-g)

**394-R.** (German.) **A Specific Corrosion Phenomenon on Tungsten Contacts.** Albert Keil. *Werkstoffe und Korrosion,* v. 3, July 1952, p. 263-265.

During the storage of apparatus containing large quantities of insulating materials, corrosion products are formed occasionally on the surface of tungsten contacts. Factors promoting such reactions, and importance of the phenomenon. (R6, W)

**395-R.** (German.) **Anodic Solution of Germanium.** Franz Jirsa. *Zeitschrift für anorganische und allgemeine Chemie,* v. 268, nos. 1-2, 1952, p. 84-88.

Results of experimental study on behavior of germanium anodes in acid and alkaline solutions. Results are tabulated and charted. (R5, Ge)

**396-R.** (Italian.) **Protection of Ferrous Surfaces Against Corrosion.** Erica Antinori. *Tecnica Italiana,* v. 7, May-June, 1952, p. 163-167.

Results of further experiments similar to those described in a previous article. (Mar.-Apr. 1951 issue.) Use of more concentrated solutions was studied. An emulsible oil containing sulfonic soaps gives fairly good protection from rust on cast iron. A few practical notes on use of chromates for treatment of engine cooling water. Test-panel photographs. (R10, R4, Fe, CI)

**397-R.** (Russian.) **The Problem of the Mechanism Determining the Rate of Solution of Metals in Concentrated Acids.** Ia. V. Durdin. *Zhurnal Obshchei Khimii,* v. 22(84), Jan. 1952, p. 3-17.

A study was made of the solution of Fe and Cr in HCl and $H_2SO_4$. Data are tabulated and charted. 14 ref. (R6, Fe, Cr)

**398-R. Cathodic Engineering Preview.** T. E. Nicholas. *Chemical Engineering,* v. 59, July 1952, p. 220-221.

Principles of cathodic protection for chemical reaction vessels, piping, heat exchangers, etc. (R10)

**399-R. Hastelloy Alloy B.** Edward D. Weisert. *Chemical Engineering,* v. 59, July 1952, p. 314, 316, 318, 320, 322, 324, 326, 328.

Chart shows the corrosion resistance of this Ni-Mo alloy to 190 corrosives. Includes data on mechanical properties, applications, and forms available. (R general, Q general T general, Ni, Mo)

**400-R. Corrosion Control in Water Systems.** Herbert H. Uhlig. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1736-1740.

General coverage of corrosion by water in waterworks and boiler operations. Cathodic protection, protective paints, organic coatings, metallic coatings, various "inhibitors," and the use of corrosion resistant metals and alloys. 18 ref. (R11, R4, L general, ST)

**401-R. Cooling Water Problems in the New York Metropolitan Area.** Sidney Sussman. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1740-1744.

How water treatment utilizing alkali for pH control and chromates for passivating film formation gives the most effective corrosion control in recirculating cooling-water systems. Also control in once-through cooling-water systems. Tables and photographs. (R11, R4)

**402-R. Effects of Velocity on Corrosion by Water.** H. R. Copson. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1745-1752.

A general review with emphasis on Fe, Zn, Cu, and their alloys. Pertinent unpublished data are included. Graphs, photographs, and tables. 56 ref. (R4, Fe, Zn, Cu)

**403-R. Effect of Temperature on Corrosion of Metals by Water.** Norman Hackerman. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1752-1755.

The influence of systematic temperatures and of temperature gradients on rates and distribution of corrosion reactions. Some of the important temperature-dependent properties are oxygen solubility, galvanic potentials, and precipitation rates. Various ferrous, nonferrous, and coupled metals are considered. 21 ref. (R4)

**404-R. Corrosion Control With Organic Inhibitors.** J. N. Breston, *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1755-1761.

Mechanism, properties, and conditions of application of organic inhibitors. Their application in acid cleaning solutions, cooling and refrigerating systems, steam-generating systems, oil wells, and other petroleum production and handling systems. Graphs. 57 ref. (R11)

**405-R. Inhibitors for Eliminating Corrosion in Steam and Condensate Lines.** R. C. Ulmer and J. W. Wood. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1761-1765.

Two types of treatments are advocated: introduction of alkaline substances to neutralize the acidity and introduction of film-forming materials to coat the metal. Test data were obtained in 600-psi. boiler condensate with representative materials of both types. With Cu and brass, both types gave good results. Graphs, tables, and diagrams. 22 ref. (R11, Cu)

**406-R. Action of Sodium Silicate as a Corrosion Inhibitor in Water Piping.** Leo Lehrman and Henry L. Shuldener. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1765-1769.

Results of anticorrosion treatment of water supplies of several hundred buildings in a number of different cities, during the past 25 years. Economical and efficient corrosion controls, together with theories of their mechanisms. Tables and graphs. 24 ref. (R11, Cu, Fe)

**407-R. Protection of Metals Against Pitting Tuberculation, and General Corrosion. Combined Phosphate-Chromate Treatment.** H. Lewis Kahler and Philip J. Gaughan. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1770-1774.

History of the use of chromate inhibitor. Although one of the best treatments for saving steel, it gives pitting and tuberculation when used in concentrations insufficient to stop total attack. Field data from plants now using the combination treatment show that the laboratory research data are verified in extensive plant practice. Graphs and tables. (R11, ST)

**408-R. Protective Film Formation With Phosphate Glasses.** G. B. Hatch. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1775-1780.

The chemical reaction involved in the inhibition of galvanic corrosion of steel coupled to cathodic metals by the glassy phosphates. Tables and graphs. 13 ref. (R10, ST)

**409-R. Inhibition of Galvanic Attack of Steel With Phosphate Glass.** G. B. Hatch. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1780-1786.

The effect of a number of factors commonly encountered in practice on the inhibition of the galvanic corrosion of steel coupled to copper with a glassy phosphate is quite similar to their effect on inhibition of the attack of steel alone. Numerous graphs. (R10, ST, Cu)

**410-R. Pitting Corrosion Characteristics of Aluminum; Influence of Magnesium and Manganese.** P. M. Aziz and Hugh P. Godard. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1791-1795.

This work was undertaken to determine the influence of alloying Mg and Mn with Al upon its pitting probability and pitting rate. Al in the purity range 99.5-99.99% was investigated using additions of 1.0% Mg, 1.25% Mn, and 0.5% Mg + 0.5% Mn. Tables, graphs, and photographs. (R2, Al)

**411-R. Cathodic Protection of Steel in Contact With Water.** Leon P. Sudrabin and Henry C. Marks. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1786-1791.

Protective current requirements and the reactions involved. Tables, graphs, and photographs. 30 ref. (R10, ST)

**412-R. Second Report of the Methods of Testing (Corrosion) Sub-Committee.** *Journal of the Iron and Steel Institute,* v. 171, July 1952, p. 255-272.

Results of a series of corrosion tests carried out in a number of laboratories. A new laboratory test developed by the Chemical Research Laboratory. Interim results, for 5 years' exposure, for the original field test. Appendix gives preliminary suggestions for the removal of corrosion products from mild steel specimens carrying protective metallic coatings, with or without paint. Tables and illustrations. (R11, ST, Al, Pb, Sn, Zn)

**413-R. Fretting Corrosion.** R. S. Barnett. *Lubrication Engineering,* v. 8, Aug. 1952, p. 186-188, 205-206.

Detection, mechanism, effects of various factors, cooperative work on the problem, and mitigation. Some examples. 14 ref. (R1).

**414-R. Corrosion of Copper Alloys.** E. Börje Bergsman. *Metal Industry,* v. 81, July 18, 1952, p. 52-53.

Some examples of corrosion attack, classified under four headings —tarnishing and oxidation, galvanic corrosion, stress-corrosion (season cracking), and dezincification. (R1, R2, Cu)

**415-R. Metals and Coatings to Combat Corrosion.** H. F. McConomy and J. J. Hur. *Petroleum Engineer,* v. 24, 1952, p. c28, c30.

Heavier-gage steel, Al, galvanized steel, organic resin-base coatings, and bituminous-base coatings for steel refinery tanks. (R7, L16, L26, ST, Al, Zn, CN)

**416-R. Bearing Corrosion Studied.** *Steel,* v. 131, July 28, 1952, p. 84, 87.

Results of tests on the Navy's amine acid inhibitor for brass retainer ball bearings. (R10, Cu)

**417-R.** (German.) **Recent Views on the Relationship Between Electrochemical and Chemical Corrosion.** A. Bukowiecki. *Chimia,* v. 6, July 15, 1952, p. 156-165.

Experiments show that a metal may be attacked simultaneously by electrochemical and purely chemical corrosion regardless of whether the liquid in contact with the metal is a poor or a good conductor of electricity. Diagrams, graphs, and tables. 38 ref. (R1)

**418-R. Corrosion Resisting Characteristics of Iron Modified 90:10 Cupro Nickel Alloy.** W. C. Stewart and F. L. LaQue. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 259-277.

Summary of information, particularly where resistance to attack by salt water is required. Influence of iron content and heat treatment. Behavior of the alloy under several conditions of exposure to attack by sea water. Some experiences in sulfide-polluted water and in other corrosive media. Tables, graphs, and illustrations. (R4, Cu)

**419-R. Why Power Companies Should Promote Corrosion Control.** H. H. Anderson. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 278-282.

Engineering methods of minimizing corrosion damage are reviewed, with frequent examples of the varying corrosion problems found among utilities. Various kinds of corrosion and methods used to combat it in electric-power, steam-generating, and other utility plants. 25 ref. (R general)

**420-R. Corrosion by Fluorine and Fluorine Compounds.** Ralph Landau. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 283-288.

Materials of construction useful in handling fluorine, with indications of their limitations. Specific recommendations on general design factors. General characteristics of the fluorocarbons, and of some specific fluorocarbon materials. (R5, R9)

**421-R. Some Corrosion Experiences With Aluminum Crude Oil Lines.** Almont Ellis. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 289-291.

Experiences with 63S-T6 extruded Al pipe indicate that efficiency of the inert-gas arc welded joint is not very high. Failure in a little more than 25 months as the result of pitting at annealed areas occurred. External corrosion at water crossings was observed in the form of $\frac{1}{16}$-in. pits after 16 months. Another line showed no evidence of external corrosion after 3½ years, although partly submerged in salt water. (R4, R7, Al)

**422-R. Sour Oil Well Corrosion. TP-1D. Sour Oil Well Corrosion.** J. A. Caldwell. *Corrosion* (Technical Section), v. 8, Aug. 1952, p. 292-294.

Technical Subcommittee Report. A preliminary survey of the extent of the problem was made in Arkansas, Kansas, and West Texas-New Mexico areas. Of 8125 sour-crude wells reported, about 44% were economically affected by corrosion. Costs ranged from $270 per well per year in the West Texas-New Mexico area to $2000 in the Kansas area. Substantial reduction in cost was effected in some cases by application of various remedial measures. (R7, R4, ST)

**423-R. Corrosion Resistance of Titanium, Zirconium, and Stainless Steel.** Lex B. Golden, I. Roy Lane, Jr., and Walter L. Acherman. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 1930-1939.

Corrosion in mineral acids and inorganic chlorides. Ti, Zr, and a 20-29 Cr-Ni stainless steel show excellent resistance to all concentrations of $HNO_3$. In mixed-acid solutions both Ti and stainless have better corrosion resistance than Zr. Heavy-metal chloride solutions have negligible effect on Ti, while stainless steel is badly pitted and perforated. Zr is embrittled by ferric and cupric chloride solutions but unaffected by mercuric chloride. Ti and Zr are fully resistant to solutions of alkali and alkaline-earth chlorides, while stainless steel is susceptible to pitting in these media. Ti is entirely unaffected by hypochlorite solutions, Zr is slightly embrittled, and stainless steel is badly pitted. Tables, graphs, and photographs. 22 ref. (R5, Ti, Zr, SS)

**424-R. Corrosion.** Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 44, Aug. 1952, p. 87A-88A, 90A.

Results of experiments show that stainless steels with low carbon content take a longer time at sensitizing temperatures to develop knife-line attack, or intergranular corrosion, during welding. (R2, SS)

**425-R.** (Book) **Corrosion Data Survey. Ed. 2.** G. A. Nelson. 64 pages. Shell Development Co., San Francisco. $35.00.

Evaluates corrosive effect of 462 chemicals in varying concentrations on a series of 25 metals, alloys, and nonmetallics. Compiled from various sources to serve as a guide for screening of likely materials of construction, particularly in oil and chemical plants. Qualitative rather than quantitative. Data are assembled in chart or graph form. Basic group of materials considered is steel (low-carbon), cast iron, Ni-Resist, Cu (including Sn and Al bronze), red brass, yellow brass, silicon bronze, 12% Cr steel, 17% Cr steel, 18-8 stainless, Monel, Ni, Inconel, Hastelloy, Durimet, Al, Pb.

silicon irons, glass and stoneware, rubber, asbestos, plastics and Karbate (impervious carbon).
(R general)

**426-R.** (Book) **The Corrosion Resistance of Tin and Tin Alloys.** S. C. Britton. 77 pages. 1952. Tin Research Institute, Fraser Road, Greenford, Middlesex, England.

Guiding principles, backed by results obtained in defined conditions, to aid in diagnosing cause of corrosion. Arranged in three parts: Corrosion of tin; alloys of tin; and coatings of tin and tin alloys. Includes coatings of Sn on Fe, steel, Cu and its alloys, Pb, and Al; Pb, Zn, Cd, Cu, and Ni as alloying elements; solders, fusible alloys, and bearing metals. Tables and numerous references.
(R general, Sn, SG-c, d, f)

**427-R.** (Pamphlet) **The Measurement of the Dewpoint and $H_2SO_4$ Vapour Content of Combustion Products.** W. E. Francis. *Gas Research Board,* Communication GRB 64, June 1952, 37 pages.

Relates to corrosion-prevention studies. An electrical conductivity method for determination of $SO_2$-$SO_3$ ratio in gaseous products of combustion. Research work covering variation of this ratio with factors such as degree of primary aeration, type of burner, and sulphur content of gas. Table, graphs, and apparatus diagrams. 31 ref. (R9)

**428-R.** (Pamphlet) **Report of the Director for the Year 1951.** *Gas Research Board,* Communication GRB 67, June 1952, 46 pages.

Gas production, purification and storage; refractory bricks and insulating materials; effluent problems; and utilization of gas. Latter includes a section on corrosion of appliances. (R9, B18)

# S
## INSPECTION AND CONTROL

**369-S. An Improved Apparatus for the Differential Thermal Analysis of Minerals.** J. J. Theron. *British Journal of Applied Physics,* v. 3, July 1952, p. 216-220.

Circuit diagrams and graphs. 13 ref. (S11)

**370-S. The Electrical Laboratory in a Steel Corporation.** W. A. Black. *Iron and Steel Engineer,* v. 29, July 1952, p. 95-104; disc., p. 104-105.

How electrical laboratory service can be of value to the steel industry. Applications include gaging, welding, induction, heating, analyses and automatic controlling. (S18, ST)

**371-S. A Simple Instrument for Measuring "Surface Truth" of Metal Surfaces and the Amount of Polishing Required.** G. E. Gardam. *Journal of the Electrodepositors' Technical Society,* v. 26, 1950, p. 27-34; disc., p. 35-41.

Previously abstracted from Advance Copy 4, 1950; item 209-S, 1950. (S15, L10)

**372-S. Fluorescent Ink as an Inspection Tool.** *Light Metals,* v. 15, July 1952, p. 234-235.

Use of Glo-Mor fluorescent ink for nondestructive testing. (S13)

**373-S. Turbo-Jet Engine Inspection Seeks Perfection.** L. N. Cimini and D. C. Brown. *Machinery* (American), v. 58, July 1952, p. 198-203.

Various inspection methods used for the parts of General Electric Co.'s J47 turbojet aircraft engine. (S13)

**374-S. Summary of Standard Specifications for Steel Castings.** *Materials & Methods,* v. 36, July 1952, p. 121, 123.

Data sheet with standards revised up to Apr. 1, 1952. (S22, CI)

**375-S. Spring Failures and Their Causes.** (Continued.) F. P. Zimmerli. *Metal Progress,* v. 62, July 1952, p. 84-88.

Concluding part of the 1951 William Park Woodside lecture. Endurance vs. analysis (of carbon and alloy steel); surface defects; corrosion; setting or load loss (with data on carbon, alloy, and stainless steels, brass, and phosphor bronze); improper heat treatment; plating; phosphate coatings; and decarburization. Graphs.
(S21, T7, CN, AY, SS, Cu)

**376-S. Testing Cemented Carbides.** *Metal Progress,* v. 62, July 1952, p. 124, 126, 128, 148. (Condensed from "Methods of Testing Cemented Carbide Compositions" by A. D. Stevens and J. C. Redmond.)

Chemical, physical, metallographic, and X-ray tests. Tool failure, classification of the tools, and the need for more accurate description. Contribution to ASTM Symposium on Testing Metal Powders and Metal Powder Products.
(S13, Q general, C-n)

**377-S. Meeting on Modern Methods of Checking Dimensional Interchangeability.** *Microtechnic* (English ed.), v. 6, No. 2, 1952, p. 69-147.

An address by M. F. Picard, conclusions by P. Nicolau, and the following papers: "Some Examples of the Application of Statistical Control in the Manufacture of Ball Bearings" (Translated from the French), G. Claesson; "Critical Study of Modern Methods of Statistical Control—New Control Methods," R. Cavé; "Preliminaries to the Application of Statistical Control Charts in the Automotive Industry," P. Pommier; "The Control of Quality on Mass-Produced Engineering Parts," J. Loxham; "Automatic Multiple Point Checking in Modern Mass Production," G. Bardet; and "The Use of Comparators for Production," R. Yribarren. Diagrams, tables, charts, and photographs. (S12)

**378-S.** (German.) **Ultrasonic Image Conversion by Means of a Thermally Produced Color Change.** Hans Heinrich Rust. *Angewandte Chemie,* v. 64, June 7, 1952, p. 308-311.

New technique for ultrasonic radiography (nondestructive testing). Ultrasonic heat of absorption is utilized for image conversion, color changes being produced by "thermochromes". Silver tetra-iodomercurate is applied in a thin layer to acetyl-cellulose foil, thereby producing a highly sensitive ultrasonic "exposure material" analogous to photographic film. (S13)

**379-S.** (German.) **New Method for the Production of Images in Nondestructive Investigation of Surface Defects of Products.** W. Stauffer and A. Keller. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, May 1952, p. 137-148.

The lacquer-film method. Possibilities of application, its importance, and practical execution. Macrographs. (S13, M28)

**380-S.** (German.) **Length-Measuring Technique.** A. Heiss. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, July 1, 1952, p. 609-615.

Devices for measuring physical dimensions, profiles, angles, cones, and curvatures. 76 ref. (S14)

**381-S.** (Swedish.) **A Spectrophotometric Method for Determination of Low Carbon Contents.** Per Enghag. *Jernkontorets Annaler,* v. 136, no. 5, 1952, p. 113-123.

Method for metallic materials. After burning the sample in $O_2$, $SO_2$ is removed by chromic acid and $CO_2$ is absorbed in NaOH solution containing a pH indicator. Decrease in concentration of the basic indicator is followed in a spectrophotometer. Alizarine-yellow R is shown to be useful indicator. (S11).

**382-S. Optical Comparators Simplify Inspection of Turbine Buckets.** *American Machinist,* v. 96, Aug. 4, 1952, p. 104-107.
(S14)

**383-S. Behavior of Nitrogen and Some of Its Compounds in Steel.** H. F. Beeghly. *Analytical Chemistry,* v. 24, July 1952, p. 1095-1100.

Practical methods for determining how much N is combined with a given element. Illustrative examples of the behavior of N during thermal treatment of steels containing Al, Si, and V. The analytical techniques should be helpful in research on reactions of N in steel with Al, Si, Cb, Ti, Ta, V, and Zr and for establishing relationships between composition of steel and its physical properties. They may find application in analysis of metals such as Ti or Zr. Graphs and tables. 12 ref. (S11, ST, Ti, Zr)

**384-S. Photometric Determination of Aluminum in Manganese, Bronze, Zinc Die Casting Alloys, and Magnesium Alloys.** C. L. Luke and K. C. Braun. *Analytical Chemistry,* v. 24, July 1952, p. 1120-1122.

Development of a rapid reliable method for determination of Al occurring as a major constituent in Cu, Zn, and Mg alloys.
(S11, Al, Cu, Zn, Mg)

**385-S. Photometric Determination of Aluminum in Lead, Antimony, and Tin and Their Alloys.** C. L. Luke. *Analytical Chemistry,* v. 24, July 1952, p. 1122-1126.

Method applicable to the analysis of the above and also to a wide variety of other ferrous and nonferrous alloys. (S11, Al, Pb, Sb, Sn)

**386-S. Colorimetric Determination of Niobium Using Thiocyanate.** Allen B. H. Lauw-Zecha, Samuel S. Lord, Jr., and David N. Hume. *Analytical Chemistry,* v. 24, July 1952, p. 1169-1173.

A systematic spectrophotometric study of the reaction between Cb and thiocyanate which led to the development of a rapid spectrophotometric method for determination of microgram quantities of Cb. It is said to be the most sensitive and reproducible colorimetric method yet reported. Graphs and tables.
(S11, Cb)

**387-S. Optical Determination of the Quality of Metallic Surfaces.** J. Elze and H. Grüss. *Engineers' Digest,* v. 13, July 1952, p. 211-212. (Translated and condensed from *Metalloberfläche*).

Previously abstracted from original. See item 184-S, 1952. (S15)

**388-S. Proposed Tentative Specifications for Heavy-Walled Carbon and Low Alloy Steel Castings for Steam Turbines.** *Foundry,* v. 80, Aug. 1952, p. 187-188.

Data sheet. (S22, CI)

**389-S. Use of Ultrasonic Waves for Internal Flaw Detection.** *Industry & Welding,* v. 25, Aug. 1952, p. 60, 62.

The Ultrasonoscope of Glass Developments Ltd., London. By using a persistent screen cathode-ray tube and causing the echoes to brighten the trace instead of deflecting it, an "ultrasonic image" is produced which can be examined and interpreted like a radiograph. Claimed to be of special value in weld testing.
(S13, K9)

**390-S. An Analysis of the Factors in Spectrochemical Microanalysis.** J. K. Hurwitz. *Journal of the Optical Society of America,* v. 42, July 1952, p. 484-489.

Micro-analytical apparatus was designed and constructed for study of diffusion in metals and alloys and analysis of segregates and inclusions. Versatility in changing photographic plate and sample speeds was included in the design. Graphs and tables. (S11, N1)

**391-S. Spectrochemical Determination of Tantalum and Columbium in 18 Cr—8 Ni Stainless Steel.** W. J. Poehlman and R. E. Sarnowski. *Journal of the Optical Society of America,* v. 42, July 1952, p. 489-492.

A spectrographic method for determination of Ta and Cb, in the concentration ranges 0.01-0.40% and 0.30-1.25%, respectively. Includes referee analyses, comparisons, working curves, and standards. (S11, SS, Ta, Cb)

**392-S. Progress of Gas Turbine Truck Tests.** Henry C. Hill. *SAE Quarterly Transactions,* v. 6, July 1952, p. 395-408; disc., p. 408.

Results of a year of test runs with the experimental gas-turbine-powered motor trucks currently being developed by Boeing. Performance and operating characteristics are compared with those of heavy-duty diesel trucks, including mechanical engine troubles. Blade failures caused by fatigue and thermal shock. Graphs and tables. (S21, Q7, SG-h)

**393-S. Optical Gaging Checks 41 Dimensions in 40 Seconds.** *Steel,* v. 131, July 28, 1952, p. 78-79.

Accurate mechanical method of inspection for checking a rotor part of an artillery shell booster. Method uses 27 gages and one experienced man. (S14)

**394-S. X-Ray Gages Show Crop Point Accurately.** *Steel,* v. 131, July 28, 1952, p. 80-81.

Radiant beam provides precise, continuous indication of seamless steel pipe-wall thickness for determining correct crop length. The gages have effected considerable savings in material and labor. (S14, ST)

**395-S. Isotopes Aid Weld Inspection.** *Steel,* v. 131, Aug. 11, 1952, p. 88-89.

Use of $Co^{60}$ in nondestructive testing at Tonawanda, N. Y., plant of Linde Air Products Co. (S19, K9)

**396-S. Temperature Standardization: Big Gains in Research.** R. E. Wilson. *Steel,* v. 131, Aug. 11, 1952, p. 90-92.

Work of National Bureau of Standards in extending its temperature standardization toward extremes of the temperature scale. (S22)

**397-S. Accurate Pyrometry and Furnace Control Pays at Douglas.** *Western Machinery and Steel World,* v. 43, July 1952, p. 74-77.

Necessity of control in proper heat treating of metals (especially Al), forming in heated dies, and curing of plastic parts to meet aircraft requirements. The precise calibration of control instruments in this work at Santa Monica Div., of Douglas Aircraft Co. (S16, Al)

**398-S. Non-Contact Gaging.** J. T. Welch. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 10-13.

The X-ray gage for measuring thickness of continuous strip, and the air gage for measuring thickness of fabricated parts. Principles, construction details, and numerous applications. (S14)

**399-S. An Electronic Control System for Industrial Control Applications.** Elwood T. Davis. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 14-18.

System provides three control functions—proportional position, automatic reset, and rate control. Example used is a fuel-fired temperature-controlled process, but the system is applicable to any measurable process variable for which there is a primary element with an electrical output. Compares electric and pneumatic controls. Circuit diagrams and photographs. (S18)

**400-S. Hydraulic Servocontrols in the Steel Industry.** H. Ziebolz. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 19-21.

Applications, performance, advantages, and disadvantages of hydraulic servosystems, and a method for obtaining proportional-plus-reset control. Diagrams. (S18, ST)

**401-S. Pneumatic Servomechanisms in the Iron and Steel Industry.** A. A. Markson. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 21-24.

Advantages and limitations of air as a control fluid. Transmission factors associated with pneumatic signals. Typical oil-operated and air-operated servomechanisms are compared; design problems. Diagrams and performances curves. (S18, Fe, ST)

**402-S. Radiographic Inspection of Steel Castings.** John M. Flanagan. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 25-26.

History of radiographic inspection. Compares various radiographic methods in general use. Importance and use of contracts and specifications in radiographic inspection. (S13, CI)

**403-S. Methods for Sorting Mixed Metals.** Antony Doschek. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 26-33.

Methods and instrumentations which have been applied to mixed-metals sorting problems as well as a few methods not commercially available. Diagrams. (S10)

**404-S. Comparison of Methods for Measuring Temperature of Molten Metals.** J. W. Percy. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 33-36.

History, and comparison of immersion thermocouples and blow-tube pyrometers, with special reference to steelmaking. Diagrams. (S16, ST)

**405-S. A Thermocouple System for Molten-Metal Temperature Measurement.** L. H. Veiock. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 36-38.

Construction and operation details of an immersion type Pt—Pt + Rh thermocouple in use at the acid openhearth shop of Heppenstall Co., Pittsburgh. Photographs, diagrams, and graphs. (S16, ST)

**406-S. Radiation Pyrometers Control New High-Gradient Heating Process.** H. W. Cox. "Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry" (Instruments Publishing Co., Pittsburgh), 1951, p. 39-40.

Temperature-control system for the high-speed high-gradient line of 13 furnaces at the Gary plant of National Tube Co. Photo-electric cells actuate the control system as the tubes pass through the furnace. A tachometer generator records line speed. Diagrams. (S16, F26, ST)

**407-S.** (English.) **Determination of Nitrogen in Steel.** R. H. A. Crawley. *Analytica Chimica Acta,* v. 7, July 1952, p. 63-67.

Accuracy of measurement of small amounts of nitrogen in steel by chemical methods is dependent on satisfactory procedures for converting the nitrides into $NH_3$, and for measuring the $NH_3$ thus formed. Color intensity is measured on an absorptiometer. (S11, ST)

**408-S.** (English.) **Measurement of the Thickness of Metal Plate by Ultrasonic Harmonic Method. II. Electronic Operation and Results of a Field Inspection.** Sakae Tanaka. *Science Reports of the Research Institutes, Tohoku University,* ser. A, v. 3, Apr. 1951, p. 201-203.

Arrangements of the circuit and construction of the apparatus. Use for determination of wall thickness of the penstock at an electric power plant as compared with direct readings obtained by drilling. (S14)

**409-S.** (French.) **Determination of the Atomic Concentrations of Thorium and Uranium in Minerals by Means of X-Ray Emission Spectrography.** Madeleine Tournay. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, June 23, 1952, p. 2527-2529.

Description of method includes graph. (S11, U, Th)

**410-S.** (French.) **Study of Platinum—Platinum-Rhodium Thermocouples, and Their Industrial Applications.** Marcel Chaussain. *Fonderie,* June 1952, p. 2955-2970.

Methods for testing Pt wires, their contamination, and their applications in industry for determining temperature of molten steel. Tables, graphs, diagrams, and illustrations. (S16)

**411-S.** (French.) **Considerations Relative to Determination of Oxygen, and of Inclusions, in Steel.** J. Varetto and L. Lacomble. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués a l'Industrie,* ser. 9, v. 8, July 1952, p. 270-274.

Various methods, particularly the Gotta method and the vacuum-fusion method. Proposes improvements. (S11, M23, ST)

**412-S.** (French.) **Spectrographic Determination of Fluorine in Slags.** J. Gillis, J. Eeckhout, and N. Kemp. *Revue universelle des Mines, de la Métallurgie des Travaux publics, des Sciences et des Arts appliqués l'Industrie,* ser. 9, v. 8, July 1952, p. 284-288.

A continuous arc method. Results and range of accuracy. (S11, B21)

**413-S. For Faster Non-Destructive Testing: Semi-Automatic X-Ray Equipment.** David Goodman. *American Foundryman,* v. 22, Aug. 1952, p. 62-63.

Use of semi-automatic X-ray units coupled with automatic film developers makes speed and quality compatible. (S13)

**414-S. Air May Solve Your Gaging Problem.** Wm. T. Nystrom. *American Machinist,* v. 96, Aug. 18, 1952, p. 103-105.

Illustrated applications, with emphasis on velocity-type air gages. (S14)

**415-S. The Spectrochemical Analysis of Tungsten.** C. H. R. Gentry and G. P. Mitchell. *Metallurgia,* v. 46, July 1952, p. 47-51.

Details of recommended procedures. Working curves and tabular data. (S11, W)

**416-S. The Photometric Determination of Arsenic and Antimony in Tin.** W. C. Coppins and J. W. Price. *Metallurgia,* v. 46, July 1952, p. 52-54.

Method described obviates the necessity of working with large samples. A preliminary separation is necessary for both elements, after which the molybdenum blue method is used for As and the iodo-antimonite complex method for Sb. (S11, As, Sb, Sn)

**417-S. Micro-Interferometry for Surface Measurements.** R. E. Sugg. *Product Engineering,* v. 23, Aug. 1952, p. 156-157.

Equipment, procedures, and typical results. Comparative photomicrographs and interferograms. (S15)

**418-S. Putting Ultrasonics to Work.** Boyd Wise and Dale Ensminger. *Product Engineering,* v. 23, Aug. 1952, p. 180-185.

Miscellaneous applications both in and above the sonic range to locate flaws in metals, mix incompatible liquids, cut tough materials, and clean precision machined parts. Equipment and procedures. Includes glossary of ultrasonic terms. (S13, L10)

**419-S. Proposed Tentative Specifications for Brazing Filler Metals.** *Welding Journal,* v. 31, Aug. 1952, p. 645-650.

Prepared by a subcommittee jointly sponsored by AWS and ASTM. Includes tables of chemical-composition requirements; standard forms and sizes; dimensional tolerances; and solidus, liquidus and brazing-range temperatures. Operating characteristics and usability of each class. (S22, K8, SG-f)

**420-S.** (Book) **ASTM Specifications for Steel Piping Materials.** 384 pages. 1952. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.50.

Contains in latest approved form 56 ASTM specifications for carbon and alloy-steel pipe and tubing, including stainless. Materials covered include: pipe used to convey liquids, vapors, and gases at normal and elevated temperatures; still tubes for refinery service; heat-exchanger and condenser tubes; boiler, superheater, and miscellaneous tubes. Includes specifications for castings; forgings and welding fittings; bolts and nuts. (S22, ST)

**421-S.** (Book) **Isotopes—a Five-Year Summary of United States Distribution.** 451 pages. 1951. U. S. Atomic Energy Commission, Washington, D. C.

A detailed account of isotope utilization during the first 5 years of the Commission's distribution program. Documentary evidence of the value of radioactive and concentrated stable isotopes to modern research and technology in science, medicine, agriculture, and industry. Mainly consists of tables listing institution, worker, isotope, purpose, and status or reference for each use. 1400 ref. (S19)

**422-S.** (Book) **Proceedings, First Annual Conference on Instrumentation for the Iron and Steel Industry.** 48 pages. 1951. Instruments Publishing Co., 1921 Ridge Ave., Pittsburgh 12, Pa. $2.00.

Eleven papers presented at conference held in Pittsburgh, Mar. 28-29, 1951, on gaging, temperature measurement, inspection and control. Individual papers are separately abstracted. (S16, S18, ST)

**423-S.** (Book) **Sampling Inspection by Variables.** Albert H. Bowker and Henry P. Goode. 216 pages. 1952. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. $5.00.

Presents a set of plans for sampling inspection where item quality is expressed on a variable basis. In general, these sampling plans and the procedures for their use were developed for the needs of acceptance inspection of raw materials, semi-finished parts, or completed products. (S12)

# T

## APPLICATIONS OF METALS IN EQUIPMENT

**389-T. Alloy Plate Mounts.** John Stephenson. *British Printer,* v. 65, July-Aug. 1952, p. 60-61, 66.

A printing plate mount having a honeycomb duraluminum base. (T9, Al)

**390-T. Metals and Metal Processing in the Atomic Energy Field.** Alan U. Seybolt. *Combustion,* v. 24, July 1952, p. 47-50.

Some properties of a few of the "newer" metals of more or less interest in the atomic energy program, and some of the processes used in manufacturing or fabricating these metals. Zr, Be, and Na are discussed at length. Processes of melting and casting, fabrication, welding, and powder metallurgy. (T26, E general, F general, G general, H general, Zr, Be, Na)

**391-T. Aluminum Connectors—the Manufacturer's Viewpoint.** *Electric Light and Power,* v. 30, July 1952, p. 89-97.

Round-table comments from people who are expected to supply the fittings and accessories that will make the changeover to Al practicable. Various types illustrated. (T1, Al)

**392-T. How Gas Fuel Helped Make Aluminum for the World's Newest Ship.** Arthur Q. Smith. *Industrial Gas,* v. 31, July 1952, p. 13-16, 27-28.

Furnace equipment and procedures for fabrication of miscellaneous Al items in *S. S. United States.* (T22, Al)

**393-T. Progress and Future of Structural Aluminium.** C. Marsh. *Light Metals,* v. 15, July 1952, p. 219-220.

A brief survey, with special reference to Swiss conditions. (T26, Al)

**394-T. Aluminium in Paper Making Plant.** *Light Metals,* v. 15, July 1952, p. 238. (Translated from *Revue de l'Aluminium).* (T29, Al)

**395-T. Corrugated Aluminium for General Building in Israel.** *Light Metals,* v. 15, July 1952, p. 244-245. (T26, Al)

**396-T. Gear Manufacturers Hold Thirty-Sixth Annual Meeting.** *Machinery* (American), v. 58, July 1952, p. 212-213.

Brief report, including notes on production, molding practice, and mechanical properties of ductile iron. (T7, Ti)

**397-T. How Atomic Radiation Affects Engineering Materials.** D. O. Lesser, *Materials & Methods,* v. 36, July 1952, p. 75-78.

Need for consideration not only of conventional properties but also atomic-radiation affects when choosing engineering materials for equipment in atomic power plants and reactors. Simplified theory, experimental techniques, reactor problems, and effects on oils, elastomers, ceramics, plastics, and metals. (T25, P13)

**398-T. Aluminium Roofing Technique.** *Metal Industry,* v. 81, July 11, 1952, p. 26.

Construction of a palace roof, employing the Aygee patent system of curtain walling to provide a roof of Al sheet and glass. (T26, Al)

**399-T. Engineering Principles and Metal Requirements for Atomic Power Plants.** W. J. Koshuba and V. P. Calkins. *Metal Progress,* v. 62, July 1952, p. 97-114.

Review of nuclear energy concepts; methods of heat utilization; heat-transfer media including molten metals; kinds of reactors; primary and secondary reactor fuels; reactors in operation or under construction; reactor operation and control; construction materials for reactors; extractive metallurgy of uranium; shielding materials; and radio toxicology. (T25, P13, U)

**400-T. Furnace Flames and Efficiency.** *Metal Progress,* v. 62, July 1952, p. 154, 156. (Condensed from "Flame Radiation and Furnace Efficiency", Max Davies.)

Previously abstracted from *Murex Limited Review.* See item 252-T, 1952. (T5)

**401-T. A Completely Insulated Aluminum Window.** *Modern Metals,* v. 8, July 1952, p. 25-26.

Al window and another product, a new prefabricated Al curtain wall panel—both made by Kesko Products, Bristol, Ind. (T26, Al)

**402-T. Interview With an Aluminum Building Product Manufacturer.** *Modern Metals,* v. 8, July 1952, p. 28-30, 32.

Interview with the Sales Manager of Nichols Wire & Aluminum Co., Davenport, Iowa, covering the future of Al products, the company's present activities, and sales and economic aspects. (T26, Al)

**403-T. Aluminum in the Petroleum Industry.** *Modern Metals,* v. 8, July 1952, p. 34-36.

Al for such applications as river and bridge crossings, underground lines, sucker rods, exploratory rigs, heat exchangers, and instrument lines. (T28, T29, Al)

**404-T. The New Queen of the Seas —S. S. United States.** *Modern Metals,* v. 8, July 1952, p. 42-45.

Applications of Al. A new method was employed in driving rivets. They were first heat treated and then placed in cold storage to retard age hardening. (T22, K13, Al)

**405-T. The Glass-Aluminum Jalousie.** *Modern Metals,* v. 8, July 1952, p. 47-49.

The background of the jalousie (modernization of old-fashioned roller blind), and how it is made. (T10, Al)

**406-T. Magnesium in Canada. Yesterday — Today — Tomorrow.** *Modern Metals,* v. 8, July 1952, p. 50-51.

History and outlook and a list of Mg applications. (T general, A2, Mg)

**407-T. For Automobile Radiators: a New Aluminum Brazing Sheet.** *Modern Metals,* v. 8, July 1952, p. 52, 54.

Developed by Aluminum Co. of America, No. XA30 brazing sheet is a composite of three alloys—a 3S alloy core is coated on one side with a low-melting-point brazing alloy, and on the other side with a corrosion resistant Alclad alloy. Solution of the corrosion problem. Diagram. (T21, R4, Al)

**408-T. Have You Tried Aluminum in Your Refinery?** Ellis D. Verink, Jr. *Petroleum Refiner,* v. 31, July 1952, p. 141-144.

Uses of Al in the petroleum industry. Chemicals which have been handled and processed in Al equipment. Table and photographs. 13 ref. (T29, Al)

**409-T. New Developments in the Auto-Sembly Technique of Circuit Fabrication.** S. F. Danko. *Proceedings of the National Electronics Conference,* v. 7, 1951, p. 542-550.

The auto-sembly technique of circuit fabrication is based on use of

prefabricted conductor patterns of copper on an insulating plastic base, conventional components, and solder dip assembly of components to pattern. Various applications of these techniques. Copper-faced laminate materials are suited for temperatures up to 200° C. Patterns of aluminum, iron, bronze, and silver can also be prepared for special applications. Variations in the technique of solder-dipping in the preparation of embossed, sub-surfaced, and flush patterns, and in packaging of autosembled patterns.
(T1, K7, Cu, Al, Fe, Ag)

**410-T. Copper Dome and Gutters on UN Building.** *Sheet Metal Worker,* v. 43, July 1952, p. 45-46, 80.
Unusual design features of the dome and gutter construction on the UN General Assembly Building, New York City. Pb-coated Cu sheets were sheared to proper taper for the dome and the gutters were reinforced with stiffeners attached with explosive rivets. (T26, Cu)

**411-T.** (French.) **Brightly Polished B. B. T. Oval Aluminum Reflectors for Public Lighting.** G. Montchatre. *Revue de l'Aluminium,* v. 29, June 1952, p. 230-231.
The reflectors are prepared by electrolytic brightening and anodic oxidation. After 2½ years exposure to marine atmospheres, no damage occurred. (T10, R4, Al)

**412-T.** (French.) **Design for Vitral Fixtures.** Maurice Victor. *Revue de l'Aluminium,* v. 29, June 1952, p. 240-243.
Al-alloy shop-window fixtures include internal and external parts assembled by use of wedges and bolts. Diagrammed and illustrated. (T10, Al)

**413-T.** (French.) **Five Tons of Magnesium in the B-36 Structure.** André Chevrier. *Revue de l'Aluminium,* v. 29, June 1952, p. 244-248.
U. S. plane which incorporates about 5 tons of Mg in the form of rolled products or castings and forgings. (T24, Mg)

**414-T.** (German.) **Economic Limits to the Use of Cast Aluminum in Automobile Construction.** K. Schneider. *Giesserei,* v. 39, June 2, 1952, p. 309-311.
Compares costs for various parts in cast iron and aluminum. Technical considerations, such as weight of the vehicle, gasoline consumption, and various advantages of aluminum as compared to gray iron. Tables contain comparisons of costs and weights. (T21, Al)

**415-T.** (German.) **Cable Lead.** H. Boesche. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 5, June 1952, p. 217-219.
Damage to cables as the result of excessive oxidation, intercrystalline fractures, and coarse grain formation. Necessity of standardizing lead alloys used in cables. Graphs. (T7, Q26, R2, Pb)

**416-T. S. S. United States.** *Architectural Forum,* v. 97, July 1952, p. 119-125.
New architectural features, including extensive use of Al and its alloys. (T22, Al)

**417-T. Faceted Metal Wall for Alcoa in Pittsburgh Sets New Style in Tall Buildings.** *Architectural Forum,* v. 97, July 1952, p. 134-135.
First tall office building ever erected with all-aluminum skin.
(T26, Al)

**418-T. New Beds for Rivers of Molten Metal.** *Inco Magazine,* v. 25, no. 3, 1952, p. 9.
Ductile-iron troughs resist attack of molten Al much better than the gray iron previously used to transfer the metal from holding ladles to multiple casting units. (T5, R6, CI)

**419-T. A Comparison of Twist Drills Manufactured From Standard and Special High-Speed Steels; Effect of Various Methods of Flute Preparation.** P. Spear, I. R. Robinson, and K. J. B. Wolfe. *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 293-301.
Twist drills 1/8 in. diam. manufactured from the standard 18-4-1 high speed steel were compared with those of the same diameter made from three high speed steels of lower tungsten content. Results are charted and tabulated. Data were subjected to statistical examination. Includes X-ray diffraction patterns and micrographs. 10 ref.
(T6, G17, Q general, M27, TS)

**420-T. Tools for Clipping Drop Forgings.** *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 313-318.
A subcommittee, set up by the National Association of Drop Forgers and Stampers, has investigated current practices in design and composition of steels used in the construction of tools for removing flash from drop forgings. Diagrams and tables give compositions, hardness ranges and heat treatments. Suitable toolsteels and hard-surfacing alloys. (T5, F22, TS, SG-j)

**421-T. Manganese Steels Lengthen Rail Life.** David P. Carr. *Overseas Engineer,* v. 26, Aug. 1952, p. 12-13.
Throughout the world increasing use is being made of high-Mn steel for switches and crossings.
(T23, AY)

**422-T. Stainless Inserts Aid Furnace Design.** *Steel,* v. 131, Aug. 4, 1952, p. 102.
Improved product design and solution of a serious maintenance problem in induction furnaces for foundry, die casting, and similar applications are benefits being realized at Ajax Engineering Co., Trenton, N. J. Heli-Coil thread inserts made of stainless steel wire prevent seizure of bolts at high temperatures.
(T5, SS)

**423-T. Ryan Alloy for Exhaust Systems Resists Scaling at 1800° Temperatures.** Henry Berlinghof, Jr. *Western Metals,* v. 10, July 1952, p. 42-43.
Development of "Rynalloy" to insure the proper functioning of the ball-and-socket joints in Army personnel carriers. Composition is not given. These assemblies are used to provide flexible exhaust-gas connections between the power plant and the chassis. (T7, SG-h)

**424-T.** (French.) **Structures of Reinforced Concrete, or of Metal?** J. Verdeyen. *L'Ossature Métallique,* v. 17, July-Aug., 1952, p. 385-390.
Relative merits of both types of structures. Advantages of both for specialized tasks of their own. (T26)

**425-T.** (German.) **Observations on the Danger of Ignition of Firedamp by Metallic Sparks Produced by Friction or by Impact.** L. Weichsel. *Aluminium,* v. 28, July-Aug. 1952, p. 251-253.
The danger is eliminated by use of Al for parts of mine equipment which often come in frictional or impact contact. Sparks are not produced by friction or impact of Al.
(T28, Q9, Al)

**426-T. Applications of Copper-Clad Aluminum.** *Metallurgia,* v. 46, July 1952, p. 39-40.
Available forms and applications of German product named "Cupal".
(T general, Cu, Al)

**427-T. Portable Electronic Equipment Improved With Magnesium Die Castings.** Brone M. Walunas. *Precision Metal Molding,* v. 10, Aug. 1952, p. 27-28.
Successor to "Walkie-Talkie" manufactured by Raytheon Mfg. Co., Boston. (T1, Mg)

**428-T. Die Castings Mount and Protect Gear Mechanisms.** *Precision Metal Molding,* v. 10, Aug. 1952, p. 44-46.
Al parts for cameras and tripods made by Akeley Camera and Instrument Corp., New York. (T9, Al)

**429-T. Three Copper Alloys Used in Permanent Mold Casting and Die Castings.** *Precision Metal Molding,* v. 10, Aug. 1952, p. 47-48, 78-80.
Use in garbage-disposal units. They include a 60-40 brass permanent-mold casting, an Al-bronze permanent-mold casting, a 60-40 brass die casting, and a Si bronze die casting. (T10, Cu)

**430-T. Characteristics of Nickel-Cadmium Batteries Produced by Powder Metallurgy.** C. Berg. *Precision Metal Molding,* v. 10, Aug. 1952, p. 49-50, 83-84.
Pocket-type Ni-Cd cells produced at Easthampton, Mass. Plant of Nickel Cadmium Battery Corp. use sintered carbonyl-Ni plates. Method of production and advantages, especially greater porosity.
(T1, H general, Ni)

**431-T. Titanium: Expensive Weight Saver.** *SAE Journal,* v. 60, Aug. 1952, p. 25-30. (Based on "Application of Titanium to Aircraft Engines", by H. H. Hanink.)
Comparative mechanical-property data for Ti and other metals. Relative merits for different jet and piston-engine applications. Higher costs are balanced against weight savings for Ti and its alloys. Mechanical-property limitations and advantages are discussed.
(T24, Q general, Ti)

# V

## MATERIALS
## General Coverage of Specific Materials

**138-V. Some Methods of Preparation, Properties and Applications of Tungsten.** D. J. Jones. *Alloy Metals Review,* v. 8, June 1952, p. 2-7.
A review. Tables and graphs. 14 ref. (W)

**139-V. Nickel Conservation Research Announced by Alloy Casting Institute.** Harold Schor. *Industrial Heating,* v. 19, July 1952, p. 1234, 1236.
Research done at Battelle on development of a heat resistant material of lower alloy content than the high-Ni alloys frequently used in 900-1400° F. service. This work was incorporated into later studies which resulted in a method of Ni and Cr conservation in heat resistant castings.
(E general, CI, Ni, SG-h)

**140-V. Titanium Today.** R. S. Radcliffe. *Ordnance,* v. 37, July-Aug. 1952, p. 166-168.
Production, properties, fabrication, and applications. (Ti)

**141-V. Magnesium Goes Automotive** *SAE Journal,* v. 60, July 1952, p. 47-53. (Excerpts from "New Applications and Developments of Magnesium Alloys in Automotive Industry," by J. D. Hanawalt and G. K. Glaza.)
Progress report on fabricating methods for Mg. Die casting, machining, electroplating, forming and drawing, impact extrusion, and joining. Automotive applications.
(E13, G general, L17, K general, T21, Mg)

**142-V.** (French.) **High Speed Steels.** Claude Vouga. *Revue de Métallurgie,* v. 49, June 1952, p. 393-407.
History, structure and application, and general metallurgical aspects. Tables give standard compositions. Micrographs. 20 ref. (S22, TS)

**143-V.** (German.) **Gallium.** H. O. Nicolaus. *Metall,* v. 6, July 1952, p. 374-376.

Production, properties, and applications. Table contains physical properties and structural data. (Ga)

**144-V. Wide Range Uses Seen for New Alloy.** *Inco Magazine,* v. 25, no. 3, 1952, p. 13-14.

Cemented Cr carbide has good properties and conserves critical elements at same time. (Cr, C-n)

**145-V. A Survey of High-Temperature Materials.** J. M. Robertson. *Metal Treatment and Drop Forging,* v. 19, July 1952, p. 303-312.

Alloys used in steam and gas-turbine plants operating in the 450-950° C. range, with attendant problems of both ferritic, austenitic steels and other alloys. Compositions of 43 alloys in 9 groups tabulated. (SS, SG-h)

**146-V. Tantalum.** J. Lomas. *Mine & Quarry Engineering,* v. 18, Aug. 1952, p. 245-247.

Resources, production, properties, and applications. (Ta)

**147-V. Chrome Carbide Provides High Corrosion Resistance.** J. D. Kennedy. *Steel,* v. 131, Aug. 4, 1952, p. 92-94.

Properties and applications of new powder-metallurgy product. Corrosion resistance, mechanical and physical properties, and applications. (Cr, C-n)

**148-V. Some Hints on Fabricating Titanium.** Thomas A. Dickinson, *Steel Processing,* v. 38, July 1952, p. 333-334, 339.

Brief treatment of the above, including forging, stamping, machining, forming, welding, heat treatment, brazing, etc. Tables give mechanical, physical properties. (Ti)

**149-V. Element XXIII.** Laurence Critchell, *Steelways,* v. 8, July 1952, p. 8-11.

Vanadium, its resources, production, use in steelmaking as ferrovanadium, and as an alloying element in steel. (V, AY, Fe-n)

**150-V.** (Book) **Gmelins Handbuch der anorganischen Chemie. A4.14. Magnesium.** (Gmelin's Handbook of Inorganic Chemistry. Pt. A4, Sec. 14. Magnesium.) 336 pages. 1952. Verlag Chemie, GMBH., Hauptstrasse 127, Weinheim Bergstr., Germany. $23.81.

Completes the Gmelin Mg volume. Covers binary and ternary alloys from Mg-Zn to Mg-Re as well as surface treatment of Mg and Mg alloys. 31 binary and 105 Mg alloy systems of higher order are treated giving phase diagrams, data on intermetallic compounds, production processes, casting methods, structural data, hardening characteristics, as well as crystallographic, thermic, optical, electric, magnetic and electrochemical properties. Chemical behavior and corrosion resistance. Many surface-treatment processes and methods used by the industry. Includes chemical and electrochemical treatment methods, metallic coatings, and other surface treatments. (Mg)

**151-V.** (Book) **Gmelins Handbuch der anorganischen Chemie. System-Nummer 41. Titan.** (Gmelin's Handbook of Inorganic Chemistry. System Number 41. Titanium). Ed. 8. 480 pages. 1951. Verlag Chemie G.m.b.H., Hauptstrasse 127, Weinheim-Bergstr., Germany. (Available from Walter J. Johnson, Inc., 125 East 23rd St., New York City, or Stechert-Hafner, Inc.. 31 East 10th St., New York City.) $27.20.

Comprehensive reference volume on history, occurrence, extraction, physical properties, chemical behavior and alloys of Ti. The literature referred to comprises papers published as late as Dec. 1949. (Ti)

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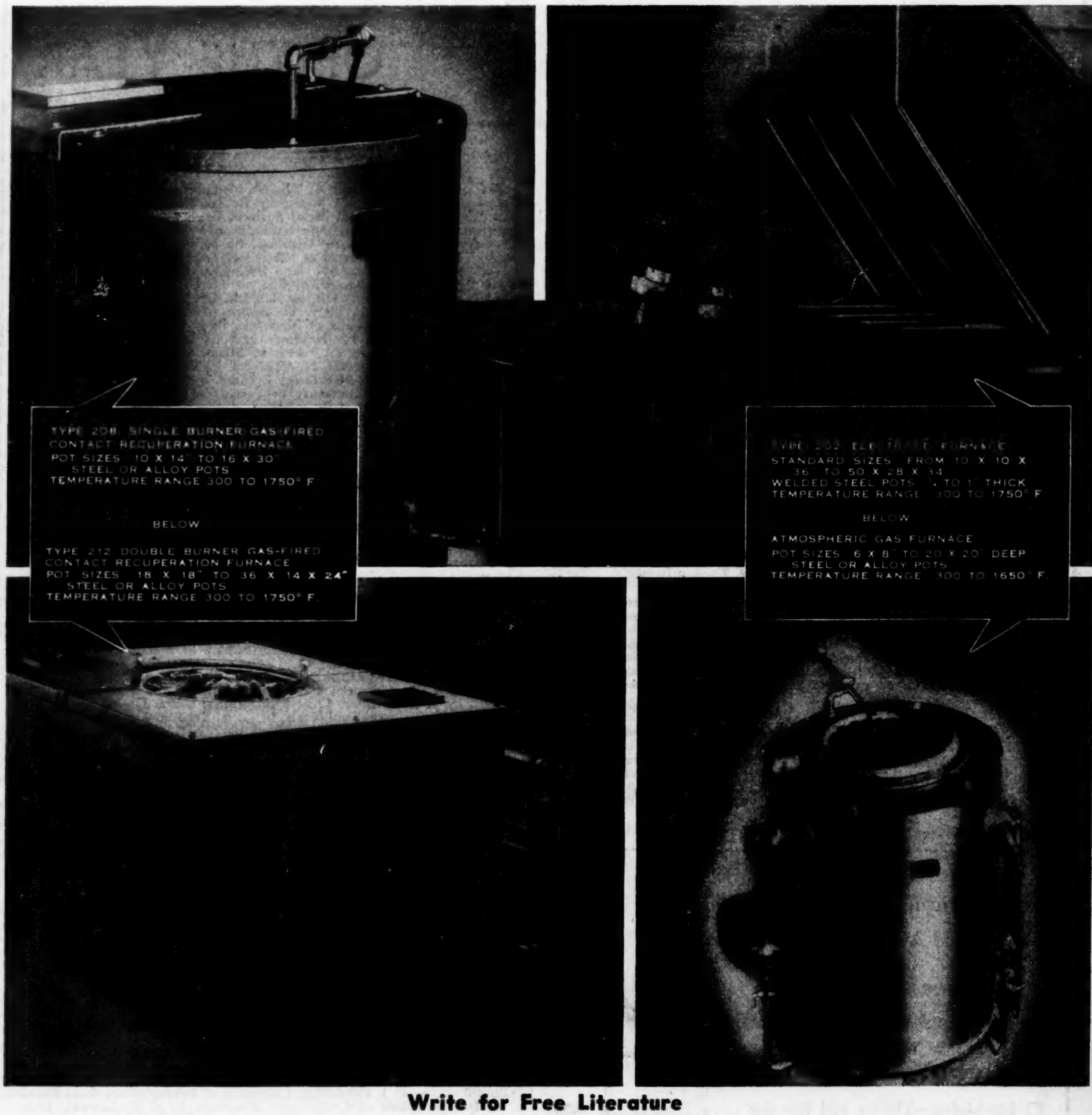


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